GROUP 35A

BASIC BRAKE SYSTEM

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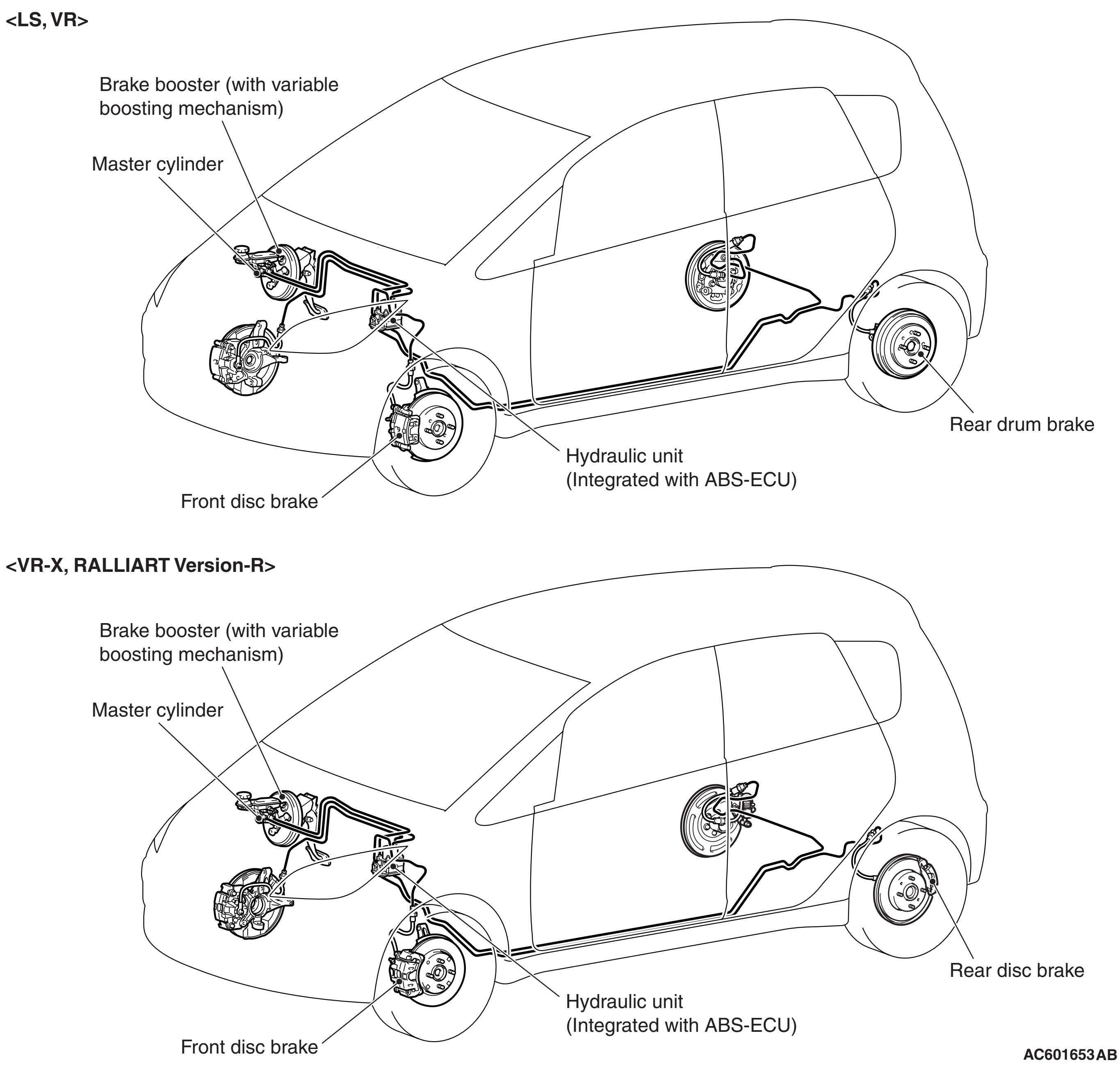
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GENERAL INFORMATION

M1351000100871

Brake system with high reliability and durability have achieved distinguished braking performance.

CONFIGURATION DIAGRAM



SPECIFICATIONS

Item			Specifications
Master cylinder	Type		Tandem type
	I.D. mm	LS, VR	20.6
		VR-X	22.2
		RALLIART Version-R	23.8
Brake booster	Type		Vacuum type, single
	Effective dia. of power cylinder mm		230
	Boosting ratio	LS, VR, VR-X	6.0 (pedal pressure: 116 N) 7.0 (pedal pressure: 159 N)
		RALLIART Version-R	6.0 (pedal pressure: 87 N) 7.0 (pedal pressure: 125 N)
Rear wheel hydraulic control method			Electronic brake-force distribution (EBD)
Front brakes	Type	LS, VR	Floating caliper, 1 piston, ventilated disc (V4-S51)
		VR-X, RALLIART Version-R	Floating caliper, 1 piston, ventilated disc (V5-S54)
	Disc effective dia. × thickness mm	LS, VR	206 × 20
		VR-X	226 × 24
		RALLIART Version-R	232 × 25.8
	Cylinder I.D. mm	LS, VR	50.8
		VR-X, RALLIART Version-R	54.0
	Pad thickness mm	LS, VR, VR-X	10
		RALLIART Version-R	10.5
	Clearance adjustment		Automatic
Rear disc brakes <VR-X, RALLIART Version-R>	Type	VR-X	Floating caliper, 1 piston, solid disc (S4-S30P)
		RALLIART Version-R	Floating caliper, 1 piston, solid disc (S4-S34P)
	Disc effective dia. × thickness mm	VR-X	224 × 10
		RALLIART Version-R	200.6 × 10
	Cylinder I.D. mm	VR-X	30.2
		RALLIART Version-R	34.0
	Pad thickness mm	VR-X	9.5
		RALLIART Version-R	10.0
	Clearance adjustment		Automatic
Rear drum brakes <LS, VR>	Type		Leading trailing drum
	Drum I.D. mm		203
	Cylinder I.D. mm		19.0
	Lining thickness mm		4.0
	Clearance adjustment		Automatic
Brake fluid			DOT3 or DOT4

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SERVICE SPECIFICATIONS

M1351000301050

Item			Standard value	Limit
Brake pedal height mm		CVT	142.9 – 145.9	–
		M/T	143.2 – 146.2	–
Brake pedal free play mm			3 – 8	–
Brake pedal to floor board clearance mm (depressing force; approximately 500 N)			70 or more	–
Front disc brake	Brake pad thickness mm	Except for RALLIART Version-R	10.0	2.0
		RALLIART Version-R	10.5	1.5
	Brake disc thickness mm	LS, VR	20.0	18.4
		VR-X	24.0	22.4
		RALLIART Version-R	25.8	23.5
	Brake disc run-out mm		–	0.06
	Brake drag force N	14-inch	46 or less	–
		15-inch (VR-X)	83 or less	–
		15-inch (RALLIART Version-R)	95 or less	–
Front wheel bearing axial play mm			–	0.05
Rear disc brake	Brake pad thickness mm	Except for RALLIART Version-R	9.5	2.0
		RALLIART Version-R	10.0	1.5
	Brake disc thickness mm	VR-X	10.0	8.4
		RALLIART Version-R	10.0	8.0
	Brake disc run-out mm		–	0.06
	Brake drag force N		46 or less	–
Rear drum brake	Brake lining thickness mm		4.3	1.0
	Brake drum inside diameter mm		203	205

LUBRICANTS

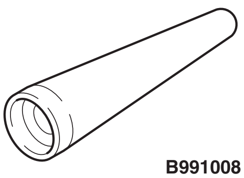
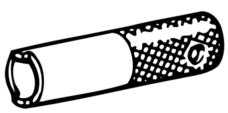
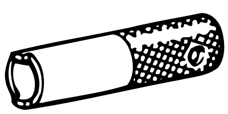
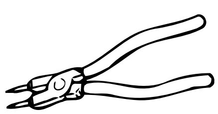
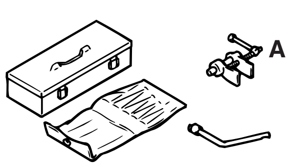
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Item		Specified lubricant	Quantity
Brake fluid		DOT3 or DOT4	As required
Front disc brake <14-inch>	Caliper body, piston, piston seal	DOT3 or DOT4	
	Piston boot, boot ring	Niglube RX-2	
	Guide pin, lock pin, pin boot	Niglube RM	
	Sim	Brake grease SAE J310, NLGI No.1	
Front disc brake <15-inch (VR-X)>	Caliper body, piston, piston seal	DOT3 or DOT4	
	Piston, piston boot, slide pin bolt, pin boot, bushing	Repair kit grease	
Front disc brake <15-inch (RALLIART Version-R)>	Guide pin, boot	Niglube RM	
Rear disc brake <VR-X>	Caliper body, support mounting, piston, sleeve boot, guide pin boot, piston boot, lever boot, spindle lever	Repair kit grease	
Rear disc brake <RALLIART Version-R>	Guide pin, boot	Niglube RM	
Rear drum brake	Backing plate, parking brake lever, auto adjuster assembly	Brake grease SAE J310, NLGI No.1	
	Wheel cylinder boot	Niglube RX-2	
	Wheel cylinder body, piston cup, piston	DOT3 or DOT4	

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SPECIAL TOOLS

M1351000600650

Tool	Number	Name	Use
 B991922	MB991922	Brake fluid filling tool	Brake line air-bleeding
 B991008	MB991008	piston cup Installer	Installation of the drum brake wheel cylinder piston cup
 MB990652	MB990652	Rear disc brake piston driver	Removal and installation of the rear disc brake piston <VR-X>
 MB990652	MB996049	Rear disc brake piston driver	Removal and installation of the rear disc brake piston <RALLIART Version-R>
 MB991041	MB991041	Snap ring pliers	Removal and installation of the rear disc brake snap ring
 MB991042	MB991042	Claw	
 MB990964	MB990964 A: MB990520	Brake tool set A: Disc brake piston expander	Pushing-in of the disc brake piston

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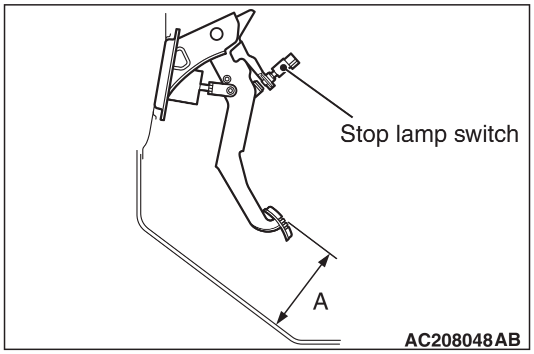
ON-VEHICLE SERVICE

BRAKE PEDAL CHECK AND ADJUSTMENT

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BRAKE PEDAL HEIGHT <EXCEPT FOR RALLIART VERSION-R>

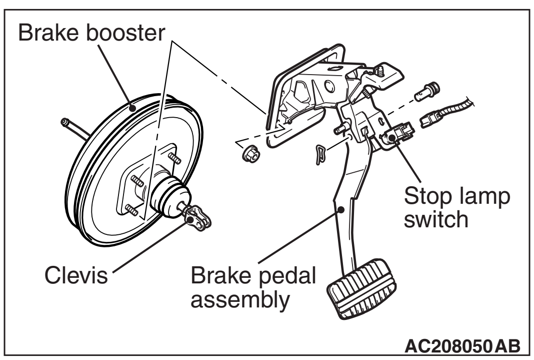
1. Turn up the carpet, etc. under the brake pedal.



2. Measure the brake pedal height as illustrated.

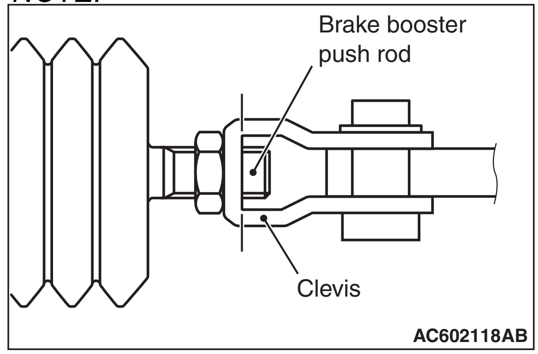
Standard value (A):
142.9 – 145.9 mm <CVT>
143.2 – 146.2 mm <M/T>
(From the surface of floor board to the face of pedal pad)

3. If the brake pedal height is not within the standard value, follow the procedure below.
   (1) Disconnect the stop lamp switch connector.
   (2) Loosen the stop lamp switch anticlockwise approximately 1/4 turns.



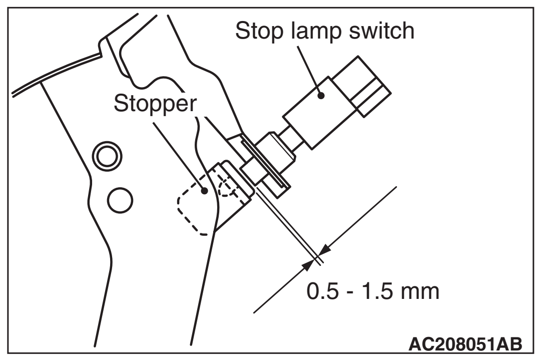
   (3) Remove the brake pedal support member assembly (Refer to P.35A-20).
   (4) Adjust the brake pedal height by turning the brake booster clevis.

NOTE:



- *When the clevis is turned 180°, the pedal height is changed approximately 1.5 mm.*
- *The extending side can be adjusted to the position where the thread section of the pushrod end does not get into the clevis.*

   (5) Install the brake pedal support member assembly (Refer to P.35A-20).



   (6) Push the stop lamp switch until its thread touches the stopper. Then secure the switch by turning it clockwise approximately 1/4 turns. During this work, pull the brake pedal towards you to hold.
   (7) Measure the brake pedal height, and ensure that the measured value is within the standard value. When it is out of the standard value, repeat Step (3) - (6).
   (8) Check that the clearance between the stop lamp switch and the stopper is as shown.

⚠ CAUTION
Check that the stop lamp does not illuminate when the brake pedal is not depressed.

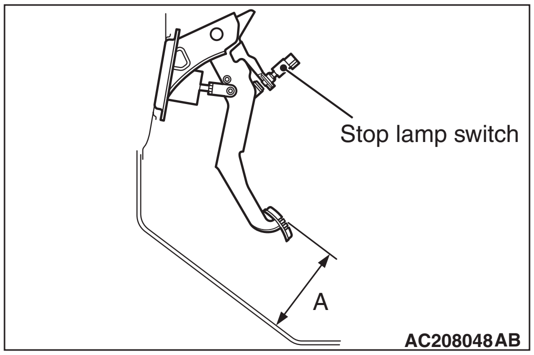
   (9) Connect the connector at the stop lamp switch.

4. Check the key interlock and shift lock mechanisms (Refer to GROUP 23A, On-vehicle Service P.23A-144).
5. Return the carpet, etc.

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BRAKE PEDAL HEIGHT <RALLIART VERSION-R>

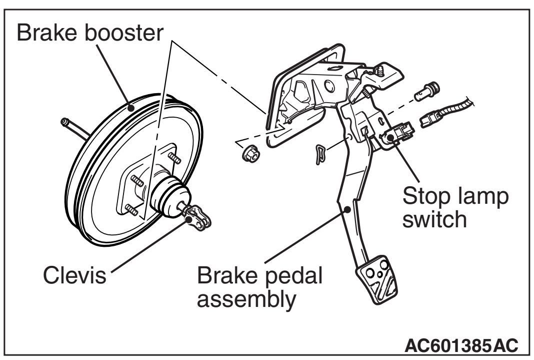
1. Turn up the carpet, etc. under the brake pedal.



2. Measure the brake pedal height as illustrated.

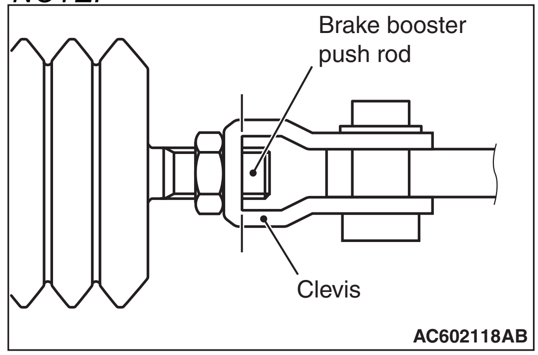
   Standard value (A): 143.2 – 146.2 mm
   (From the surface of floor board to the face of pedal pad)

3. When the brake pedal height is not within the standard value, adjust the brake pedal in the following procedure.
   (1) Disconnect the stop lamp switch connector.
   (2) Rotate the stop lamp switch anti-clockwise and remove it.



   (3) Disconnect the brake pedal and clevis connection and remove the brake pedal assembly. (Refer to P.35A-21.)
   (4) Rotate the brake booster clevis to adjust the brake pedal height.

NOTE:

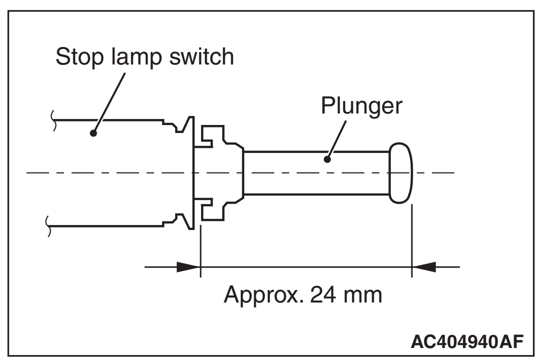


- *When the clevis is turned 180°, the pedal height is changed approximately 1.5 mm.*
- *The extending side can be adjusted to the position where the thread section of the pushrod end does not get into the clevis.*

   (5) Install the brake pedal assembly and connect the brake pedal and the clevis. (Refer to P.35A-21.)
   (6) Measure the brake pedal height, and make sure that it is within the standard value. If not within the standard value, perform the steps (3) to (5) again.

⚠ CAUTION

Pulling out the plunger section too frequently may damage the automatic adjustment mechanism section of the stop lamp switch because it is made of plastics. If the plunger section is pulled out at least 2 or 3 times, replace the stop lamp switch.



   (7) Pull out the plunger section of the stop lamp switch to the maximum length (approx. 24 mm).

   NOTE: The stop lamp switch incorporates the automatic adjustment mechanism for the plunger section.

   (8) Hold the brake pedal to prevent it from moving, and press in the stop lamp switch to the bracket of the brake pedal assembly. Then, turn the stop lamp switch clockwise to install it.

NOTE: By installing the stop lamp switch as described above, the plunger section is adjusted to the standard value automatically.

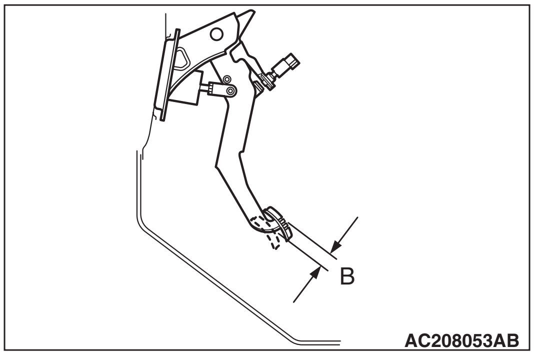
⚠ CAUTION

Check that the stop lamp does not illuminate when the brake pedal is not depressed.

(9) Connect the connector at the stop lamp switch.

4. Return the carpet, etc.

BRAKE PEDAL FREE PLAY



1. Turn the ignition switch to the "LOCK" (OFF) position, depress the brake pedal two or three times. After eliminating the vacuum in the brake booster, press the pedal down by hand, and confirm that the amount of movement before resistance is met (free play) is within the standard value range.

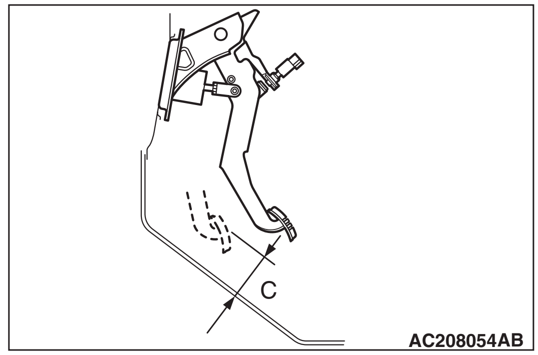
   Standard value: 3 – 8 mm

2. If the brake pedal play is not within the standard value, check the following, and adjust or replace if necessary:

- Excessive play between the brake pedal and the clevis pin, or between the clevis pin and the brake booster operating rod
- Brake pedal height
- Installation position of the stop lamp switch, etc.

CLEARANCE BETWEEN BRAKE PEDAL AND FLOOR BOARD

1. Turn up the carpet, etc. under the brake pedal.



2. Start the engine, depress the brake pedal with approximately 500 N of force, and measure the clearance between the brake pedal and the floor board.

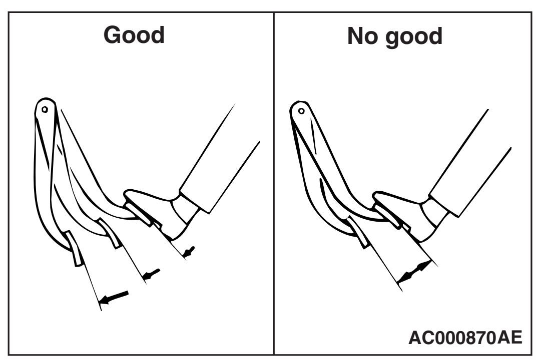
   Standard value (C): 70 mm or more
   (From the surface of floor board to the face of pedal pad)

3. If the clearance between the brake pedal and the floor is not within the standard value, check the brake lines for air-lock, the disc brake pad thickness or the drum brake lining thickness, and the parking brake for dragging. Adjust or replace defective part(s) if necessary.
4. Return the carpet etc. to its original position.

BRAKE BOOSTER OPERATING TEST

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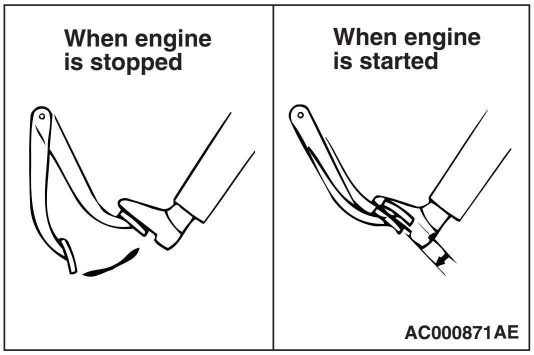
1. For simple checking of the brake booster operation, carry out the following tests:



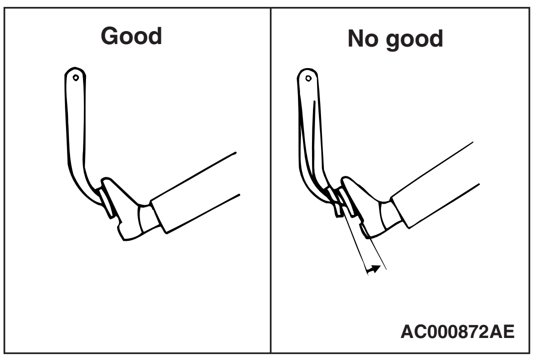
(1) Run the engine for one or two minutes, and then stop it. If the pedal depresses fully the first time but gradually becomes higher when depressed succeeding times, the booster is operating properly. If the pedal height remains unchanged, the booster is defective. Go to step 2.

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(2) With the engine stopped, step on the brake pedal several times. Then step on the brake pedal and start the engine. If the pedal moves downward slightly, the booster is in good condition. If there is no change, the booster is defective. Go to step 3.



(3) With the engine running, step on the brake pedal and then stop the engine. Hold the pedal depressed for 30 seconds. If the pedal height does not change, the booster is in good condition, if the pedal rises, the booster is defective.

2. If the above three tests are okay, the booster performance can be determined as good. If one of the above three tests is not okay, the check valve, vacuum hose, or booster is defective. Check the check valve (Refer to P.35A-10), vacuum hose for leaks, high volume engine vacuum applied to booster. Repair or replace as necessary. If these are okay, replace the booster and repeat this test starting at Step 1.

CHECK VALVE OPERATION CHECK

M1351009000495

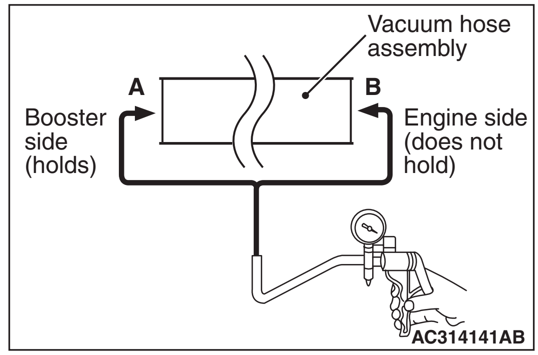
⚠ **CAUTION**

The check valve should not be removed from the vacuum hose.

1. Remove the vacuum hose (Refer to P.35A-23).

⚠ **CAUTION**

If the check valve is defective, replace it as an assembly unit together with the vacuum hose.



2. Check the operation of the check valve by using a vacuum pump.

Vacuum pump connection	Accept/reject criteria
Connection at the brake booster side (A)	A negative pressure (vacuum) is created and held.
Connection at the intake manifold side (B)	A negative pressure (vacuum) is not created.

BLEEDING

M1351001400842

⚠ **CAUTION**

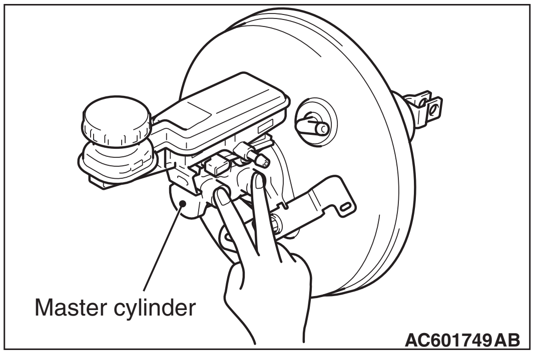
Use only brake fluid DOT 3 or DOT 4. Never mix the specified brake fluid with other fluid as it will influence the braking performance significantly.

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MASTER CYLINDER BLEEDING

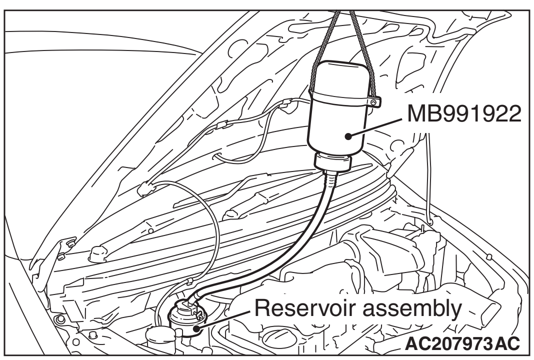
The master cylinder used has no check valve, so if bleeding is carried out by the following procedure, bleeding of air from the brake pipeline will become easier (When brake fluid is not contained in the master cylinder).

1. Fill the reserve tank with brake fluid.
2. Keep the brake pedal depressed.

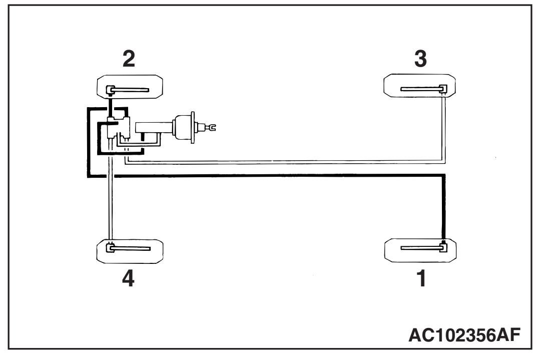


3. Have another person cover the master cylinder outlet with a finger.
4. With the outlet still closed, release the brake pedal.
5. Repeat steps 2 – 4 three or four times to fill the inside of the master cylinder with brake fluid.

BRAKE LINE BLEEDING



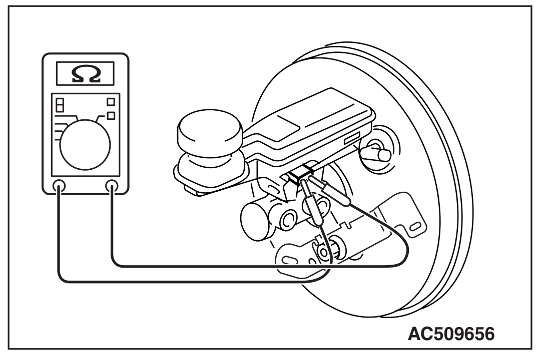
1. Install the special tool brake fluid filling tool (MB991922) as shown. Carry out air-bleeding while brake fluid is being added.



2. Start the engine and bleed the air in the sequence shown in the figure.

BRAKE FLUID LEVEL SENSOR CHECK

M1351009100663



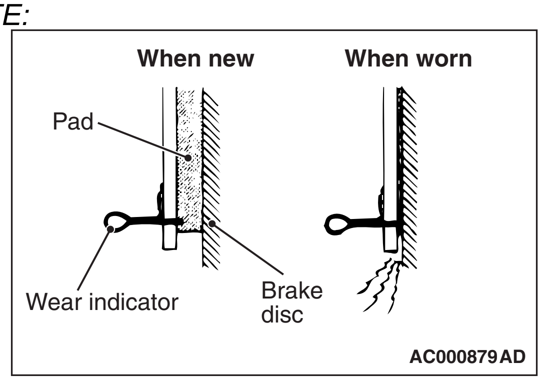
The brake fluid level sensor is in good condition if there is no continuity when the float surface is above "MIN" and if there is continuity when the float surface is below "MIN".

DISC BRAKE PAD CHECK AND REPLACEMENT <EXCEPT FOR RALLIART VERSION-R>

M1351002300848

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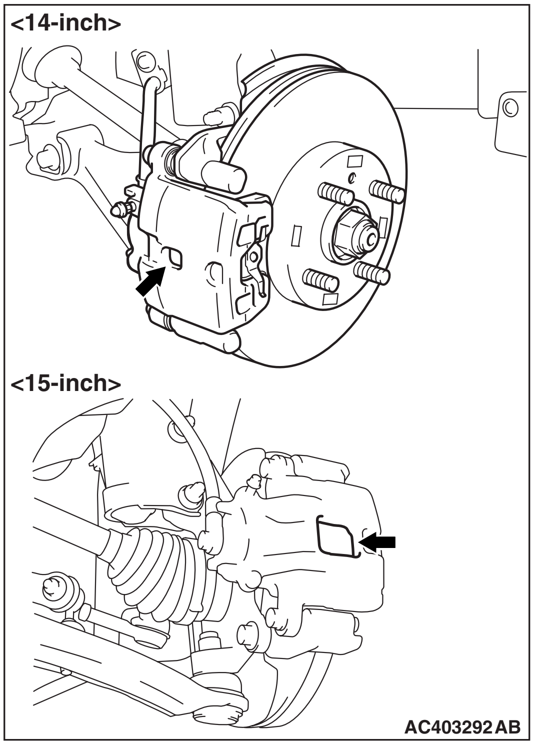
NOTE:



The brake pads have indicators that contact the brake disc when the brake pad thickness becomes 2 mm, and emit a squealing sound to warn the driver.

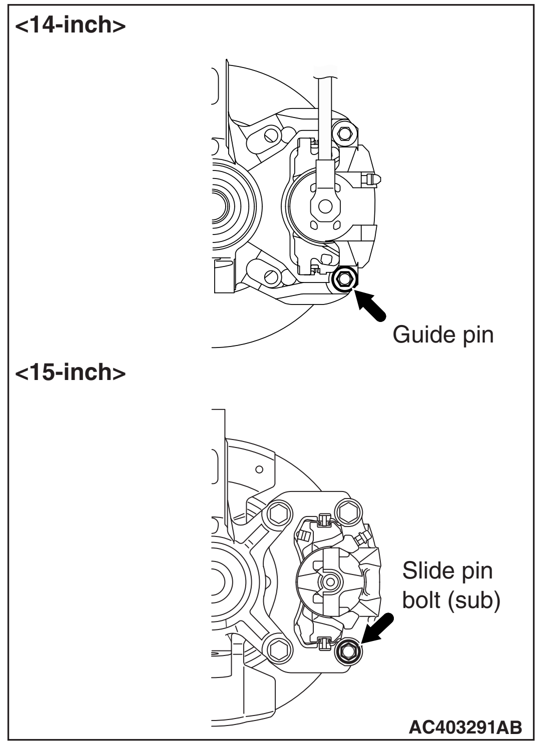
⚠ CAUTION

- **Whenever a pad must be replaced, replace both LH and RH wheel pads as a set to prevent the vehicle from pulling to one side when braking.**
- **If there is a significant difference in the thickness of the pads on the left and right sides, check the sliding condition of the piston and slide pins.**

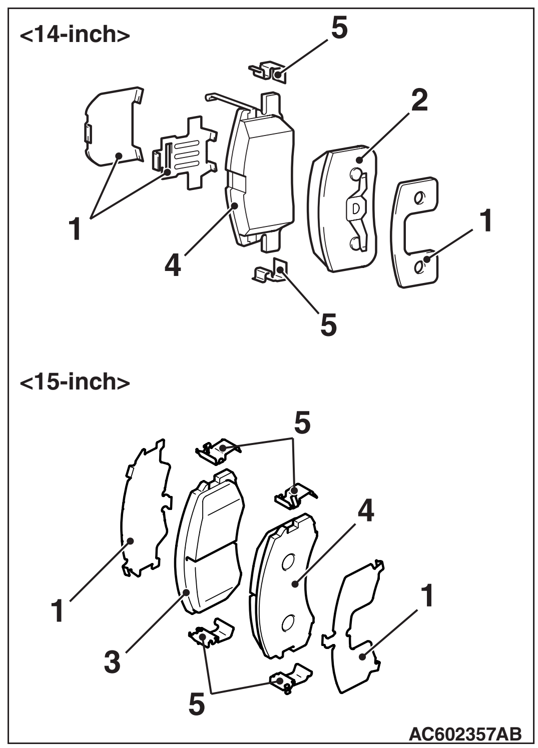


1. Check the brake pad thickness through the caliper body check port.

   Standard value: 10.0 mm
   Minimum limit: 2.0 mm



2. Remove the guide pin or slide pin bolt (sub).Pivot the caliper assembly and hold it with wires.

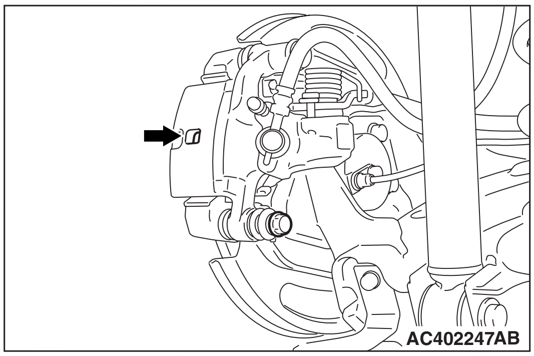


3. Remove the following parts from caliper assembly.
   (1) Shim
   (2) Outer pad <14-inch>
   (3) Pad assembly <15-inch>
   (4) Pad assembly <RH> or Pad and wear indicator assembly <LH>

(5) Pad clip

4. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub with the pads removed <Refer to P.35A-26 (14-inch) or P.35A-29 (15-inch)>.
5. Install the pads and caliper assembly, and then check the brake drag force <Refer to P.35A-26 (14-inch) or P.35A-29 (15-inch)>.

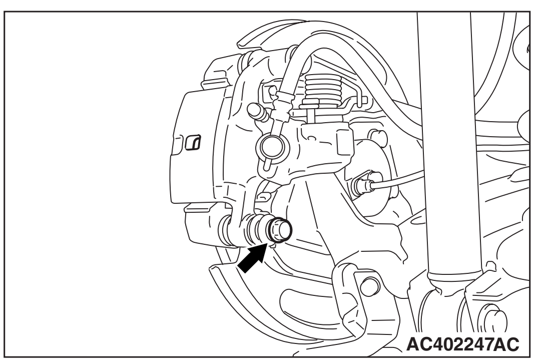
<Rear>



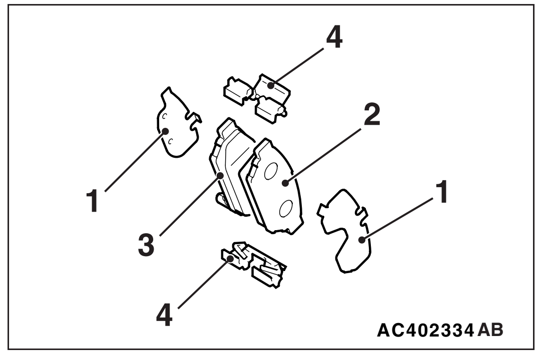
1. Visually check the thickness of brake pad from the inspection hole of the caliper body.

   Standard value: 9.5 mm
   Limit value: 2.0 mm

2. When the thickness is lower than the limit value, replace the both brake pads (right and left) as a set.
3. Disengage the connection between the rear brake caliper and rear parking brake cable.



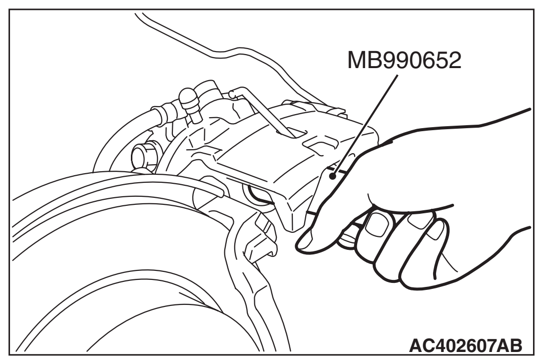
4. Remove the bolt, and swivel the caliper assembly upward to retain with a wire or other similar material.



5. Remove the following parts from the caliper assembly.
   (1) Shim
   (2) Outer pad
   (3) Pad assembly <RH> or Pad and wear indicator assembly <LH>
   (4) Pad clip
6. In order to measure the brake drag force after pad installation, measure the hub sliding torque with no pad attached (Refer to P.35A-41).

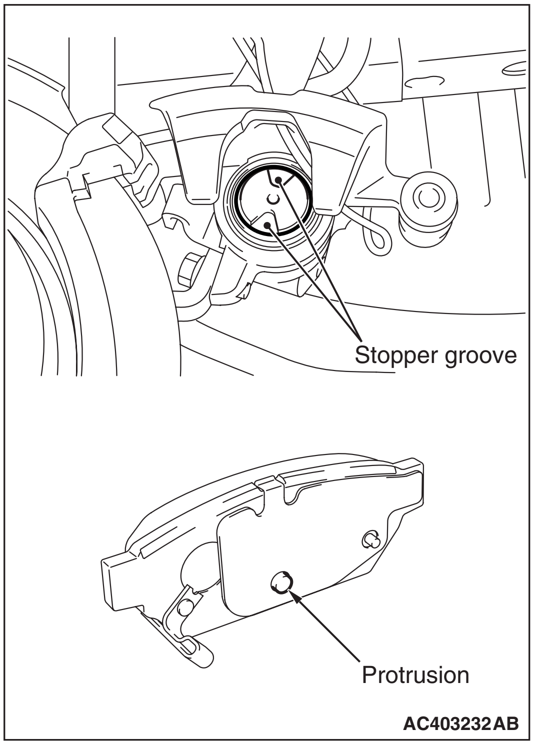
⚠ CAUTION

Keep grease or other fouling off the pad and brake disc friction surface.



7. Clean the piston, and press the piston into the cylinder using the special tool, rear disc brake piston driver (MB990652).

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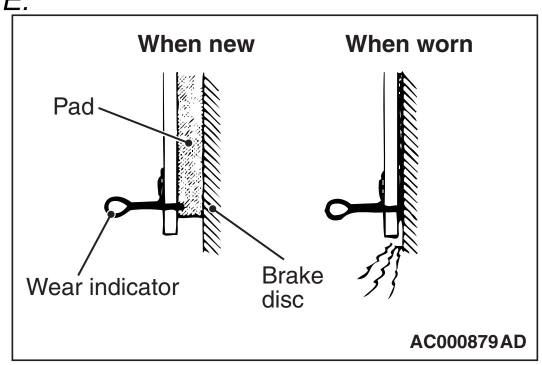
8. Set as shown so that the protrusion on the pad assembly rear face is engaged in the piston stopper groove.
9. Install the pad and caliper assembly, and check the brake drag force (Refer to P.35A-41).

DISC BRAKE PAD CHECK AND REPLACEMENT <RALLIART VERSION-R>

M1351002300859

<FRONT>

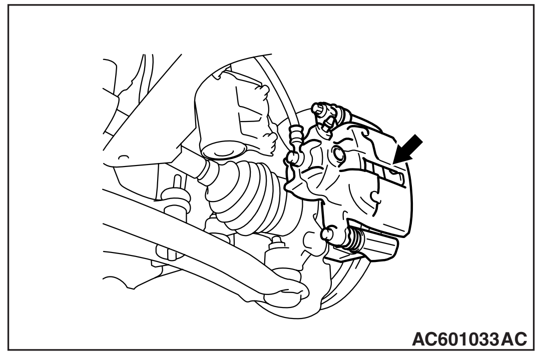
NOTE:



The brake pads have indicators that contact the brake disc when the brake pad thickness becomes 1.5 mm, and emit a squealing sound to warn the driver.

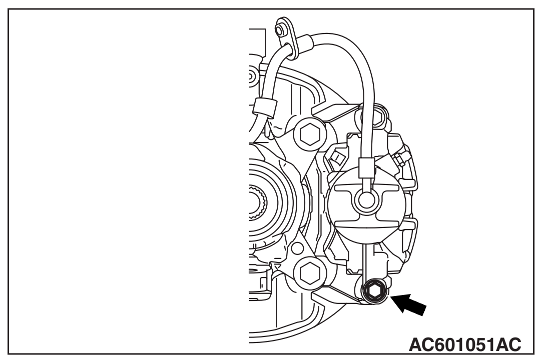
⚠ CAUTION

- **Whenever a pad must be replaced, replace both LH and RH wheel pads as a set to prevent the vehicle from pulling to one side when braking.**
- **If there is a significant difference in the thickness of the pads on the left and right sides, check the sliding condition of the piston and slide pins.**

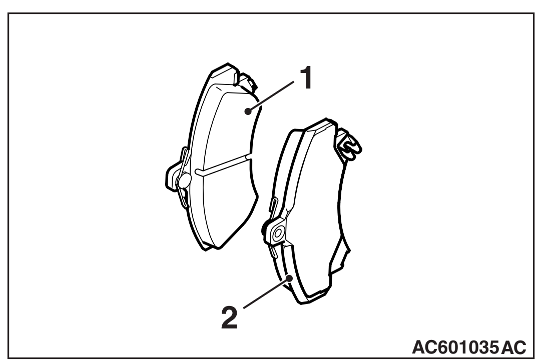


1. Check the brake pad thickness through the caliper body check port.

   Standard value: 10.5 mm
   Minimum limit: 1.5 mm



2. Remove the bolt. Pivot the caliper assembly and hold it with wires.

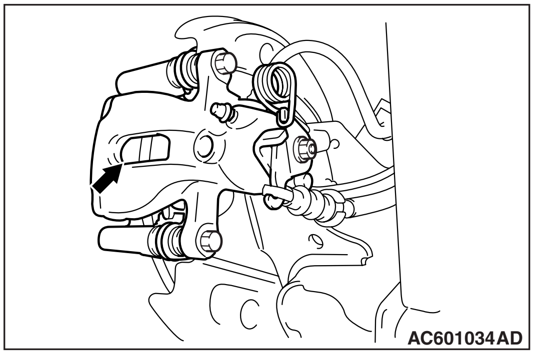


3. Remove the following parts from caliper assembly.
   (1) Pad assembly <RH> or Pad and wear indicator assembly <LH>
   (2) Pad assembly

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4. In order to measure the brake drag force after pad installation, measure the rotary-sliding resistance of the hub with the pads removed <Refer to P.35A-31>.
5. Install the pads and caliper assembly, and then check the brake drag force <Refer to P.35A-31>.

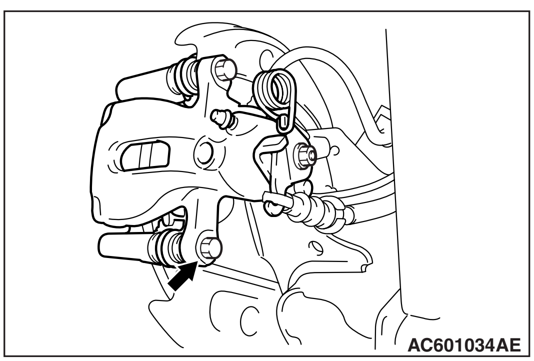
<Rear>



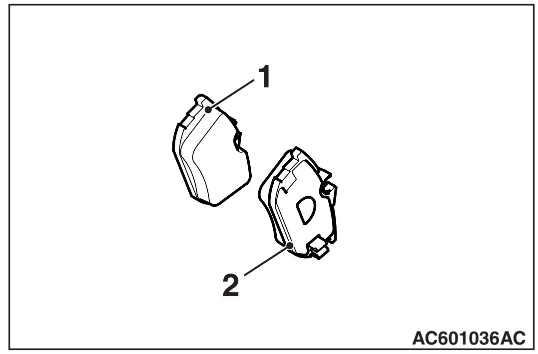
1. Visually check the thickness of brake pad from the inspection hole of the caliper body.

   Standard value: 10.0 mm
   Limit value: 1.5 mm

2. When the thickness is lower than the limit value, replace the both brake pads (right and left) as a set.
3. Disengage the connection between the rear brake caliper and rear parking brake cable.

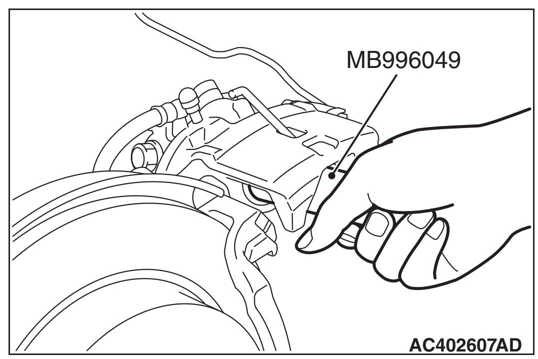


4. Remove the bolt, and swivel the caliper assembly upward to retain with a wire or other similar material.



5. Remove the following parts from the caliper assembly.
   (1) Pad assembly <RH> or Pad and wear indicator assembly <LH>
   (2) Pad assembly
6. In order to measure the brake drag force after pad installation, measure the hub sliding torque with no pad attached (Refer to P.35A-43).

⚠ CAUTION
Keep grease or other fouling off the pad and brake disc friction surface.



7. Clean the piston, and press the piston into the cylinder using the special tool, rear disc brake piston driver (MB996049).
8. Install the pad and caliper assembly, and check the brake drag force (Refer to P.35A-43).

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DISC BRAKE ROTOR CHECK

M1351002900594

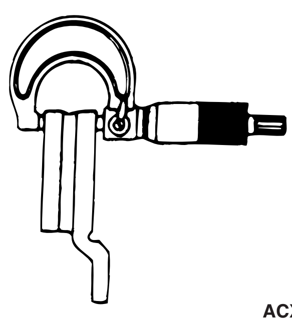
⚠ CAUTION

Disc brakes must be kept within the allowable service values in order to maintain normal brake operation.

Before turning the brake disc, the following conditions should be checked.

Inspection item	Remark
Scratches, rust, saturated lining materials and wear	• If the vehicle is not driven for a long period of time, sections of the discs that are not in contact with the pads will become rusty, causing noise and shuddering. • If grooves and scratches resulting from excessive disc wear are not removed prior to installing a new pad assembly, there will be inadequate contact between the disc and the lining (pad) until the pads conform to the disc.
Run-out	Excessive run-out of the discs will increase the pedal depression resistance due to piston kick-back.
Change in thickness (parallelism)	If the thickness of the disc changes, this will cause pedal pulsation, shuddering and surging.
Inset or warping (flatness)	Overheating and improper handling while servicing will cause warping or distortion.

BRAKE DISC THICKNESS CHECK



ACX00668

1. Using a micrometer, measure disc thickness at eight positions, approximately 45 degrees apart and 10 mm in from the outer edge of the disc.

Standard value:

<Front (LS, VR)> 20.0 mm
<Front (VR-X)> 24.0 mm
<Front (RALLIART Version-R)> 25.8 mm
<Rear> 10.0 mm

Limit value:

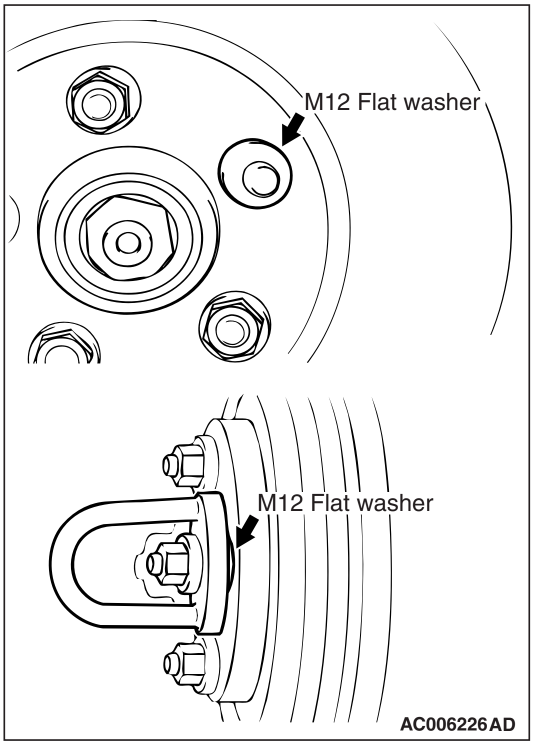
<Front (LS, VR)> 18.4 mm
<Front (VR-X)> 22.4 mm
<Front (RALLIART Version-R)> 23.5 mm
<Rear (VR-X)> 8.4 mm
<Rear (RALLIART Version-R)> 8.0 mm

NOTE: Thickness variation (at least 8 positions) should not be more than 0.015 mm.

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⚠ CAUTION

- **After a new brake disc is installed, always grind the brake disc with on-the-car type brake lathe. If this step is not carried out, the brake disc run-out exceeds the specified value, resulting in judder.**



When the on-the-car type lathe is used, first install M12 flat washer on the stud bolt in the brake disc side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disc rotor may be deformed, resulting in inaccurate grinding.

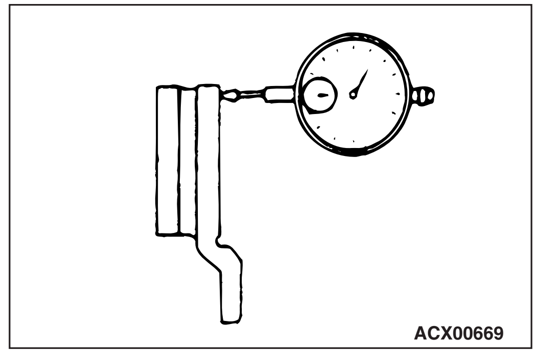
- **Grind the brake disc with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m. When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disc rotor or drum may be deformed, resulting in judder.**

2. If the disc thickness is less than the limits, replace it with a new one.

   If thickness variation exceeds the specification, turn rotor with an on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent). If the calculated final thickness after turning the rotor is less than the standard value, replace the disc.

FRONT BRAKE DISC RUN-OUT CHECK AND CORRECTION

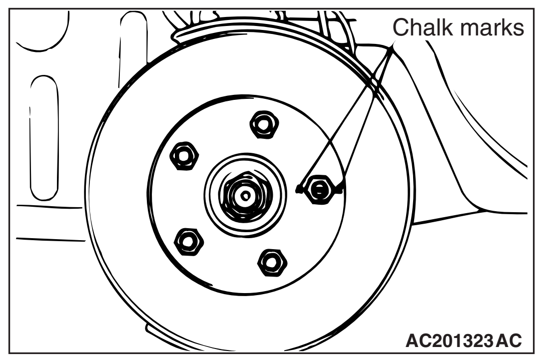
1. Remove the brake assembly, and then hold it with wire.
2. Temporarily install the disc with the hub nut.



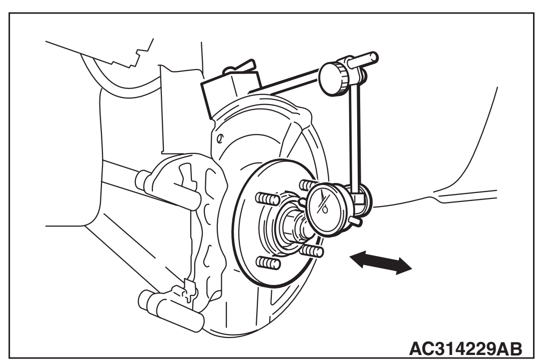
3. Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

   Limit: 0.06 mm

4. If the brake disc run-out exceeds the limit, correct it as follows:



(1) Chalk phase marks on the wheel stud and the brake disc, which run-out is excessive as shown.



(2) Remove the brake disc. Then place a dial gauge as shown, and measure the axial play by pushing and pulling the wheel hub.

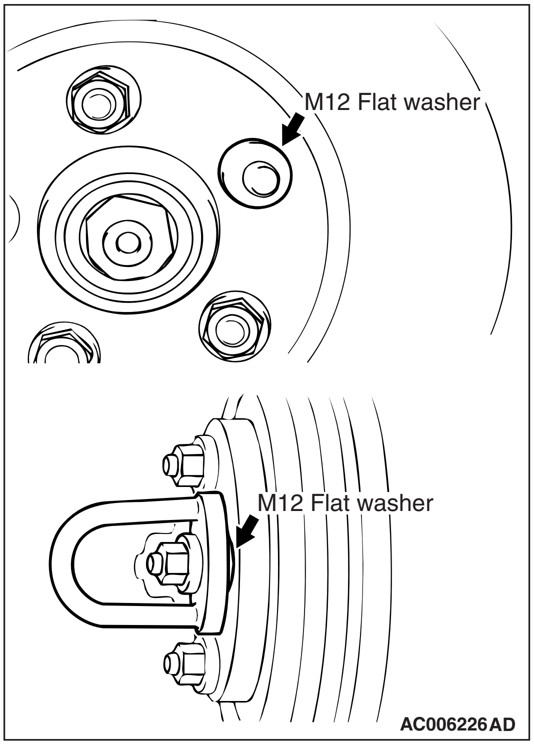
Limit: 0.05 mm

(3) If the axial play exceeds the limit, disassemble the hub assembly to check each part.

(4) If the axial play does not exceed the limit, dephase the brake disc and secure it. Then recheck the brake disc run-out.

⚠ CAUTION

- **After a new brake disc is installed, always grind the brake disc with on-the-car type brake lathe. If this step is not carried out, the brake disc run-out exceeds the specified value, resulting in judder.**



When the on-the-car type lathe is used, first install M12 flat washer on the stud bolt in the brake disc side according to the figure, and then install the adapter. If the adapter is installed with M12 flat washer not seated, the brake disc rotor may be deformed, resulting in inaccurate grinding.

- **Grind the brake disc with all wheel nuts diagonally and equally tightened to the specified torque 100 N·m. When all numbers of wheel nuts are not used, or the tightening torque is excessive or not equal, the brake disc rotor or drum may be deformed, resulting in judder.**

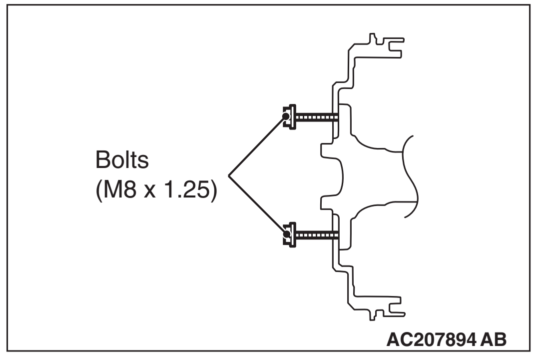
5. If the run-out cannot be corrected by changing the phase of the brake disc, replace the brake disc or grind it with the on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent).

BRAKE LINING THICKNESS CHECK

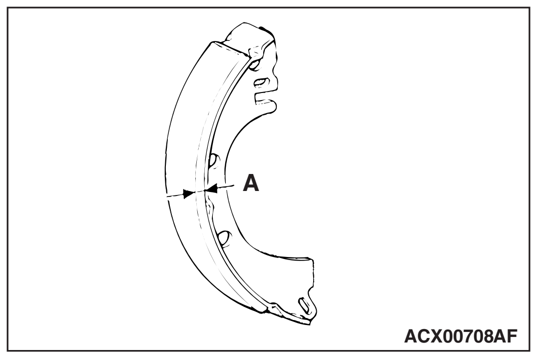
M1351003000527

⚠ CAUTION

- **Whenever the shoe and lining assembly is replaced, replace both RH and LH assemblies as a set to prevent the car from pulling to one side when braking.**
- **If there is a significant difference in the thickness of the shoe and lining assemblies on the left and right sides, check the sliding condition of the piston.**



1. Use M8×1.25 bolts as shown to remove the brake drum by tightening them evenly.



2. Measure the thickness of the brake lining at the area with the worst wear.

   Standard value: 4.0 mm
   Minimum limit: 1.0 mm

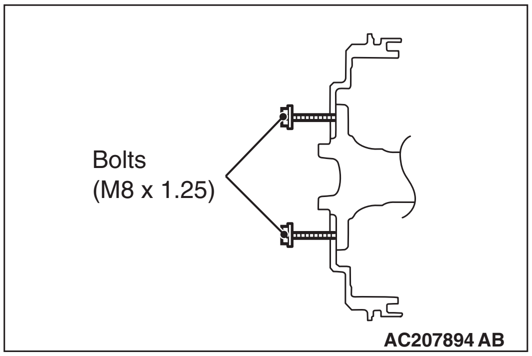
3. Replace the shoe and lining assembly if the brake lining thickness is less than the limit or if it is not worn evenly. For installation procedures for the shoe and lining assembly, refer to P.35A-50.

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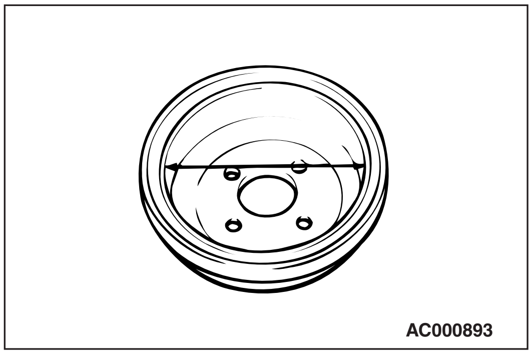
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BRAKE DRUM INSIDE DIAMETER CHECK

M1351003200576



1. Use M8×1.25 bolts as shown to remove the brake drum by tightening them evenly.



2. Measure the inside diameter of the brake drum at two or more locations.

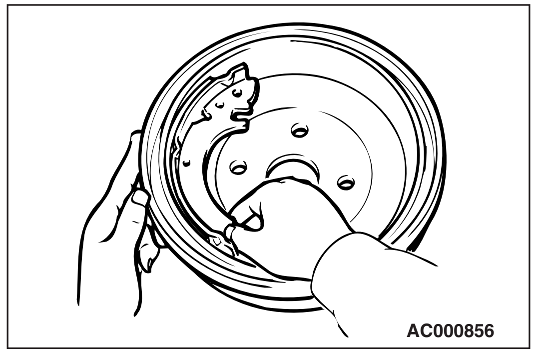
   Standard value: 203 mm
   Limit: 205 mm

3. Replace the brake drums, shoe and lining assembly when wear exceeds the limit value or is badly imbalanced.

BRAKE LINING AND BRAKE DRUM CONTACT CHECK

M1351003100375

1. Remove the brake drum.
2. Remove the shoe and lining assembly (Refer to P.35A-50).



3. Chalk the inner surface of the brake drum and rub with the shoe and lining assembly.
4. Replace the shoe and lining assembly or brake drums if there are any irregular contact areas.

   NOTE: Clean off chalk after check.

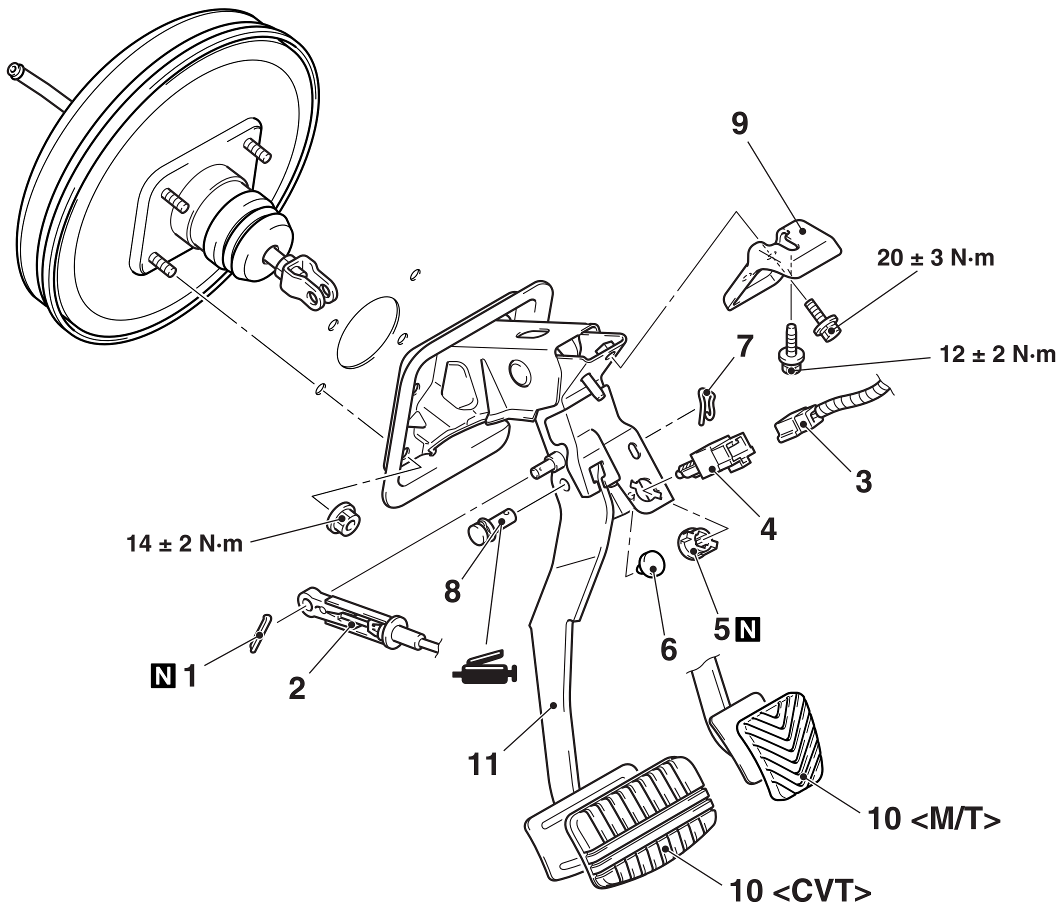
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BRAKE PEDAL

REMOVAL AND INSTALLATION <EXCEPT FOR RALLIART VERSION-R>

M1351003400848

Post-installation Operation
- Brake Pedal Adjustment (Refer to P.35A-7).



AC601323AB

Removal steps

- Steering column cover <CVT>
- Shift lock rod connection <CVT> (Refer to GROUP 23A, CVT Key Interlock and Shift Lock Mechanism P.23A-148).
- Shift lock unit <CVT> (Refer to GROUP 23A, CVT Key Interlock and Shift Lock Mechanism P.23A-148).

1. Split pin <CVT>
2. Shift lock cable connection <CVT>
3. Harness connector
4. Stop lamp switch
5. Pedal clip
6. Pedal stopper
7. Snap pin
8. Pin assembly

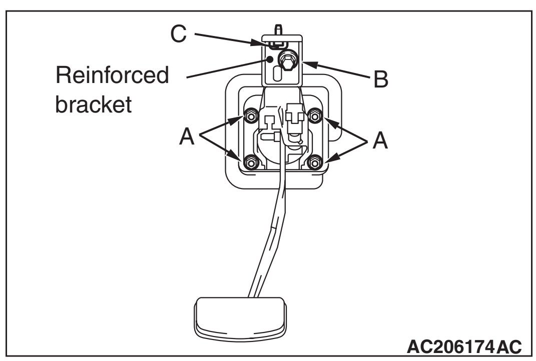
>>**A**<< 9. Reinforced bracket
10. Pedal pad

>>**A**<< 11. Brake pedal assembly

INSTALLATION SERVICE POINTS

>>A<< BRAKE PEDAL ASSEMBLY/REINFORCED BRACKET INSTALLATION

1. Temporarily tighten the brake pedal assembly.
2. Temporarily tighten the reinforced bracket.



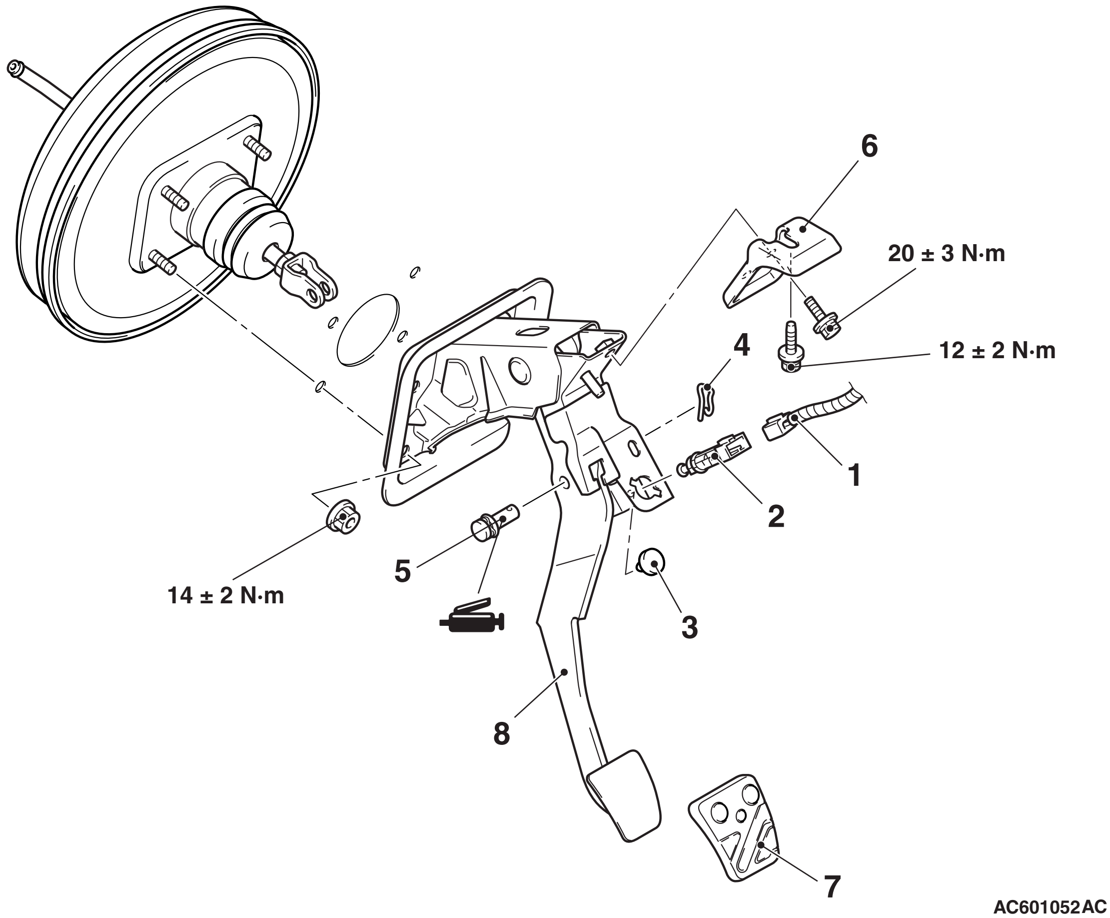
3. Tighten the mounting nuts and bolts in alphabetical order shown in the illustration.

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REMOVAL AND INSTALLATION <RALLIART VERSION-R>

M1351003400837

Post-installation Operation
- Brake Pedal Adjustment (Refer to P.35A-7).



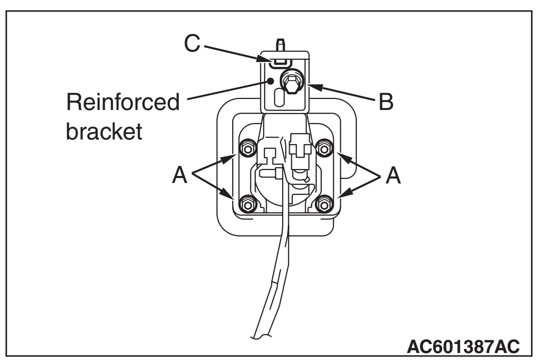
Removal steps

	1.	Harness connector
>>**B**<<	2.	Stop lamp switch
	3.	Pedal stopper
	4.	Snap pin
	5.	Pin assembly
>>**A**<<	6.	Reinforced bracket
	7.	Pedal pad
>>**A**<<	8.	Brake pedal assembly

INSTALLATION SERVICE POINTS

>>A<< BRAKE PEDAL ASSEMBLY/REINFORCED BRACKET INSTALLATION

1. Temporarily tighten the brake pedal assembly.
2. Temporarily tighten the reinforced bracket.



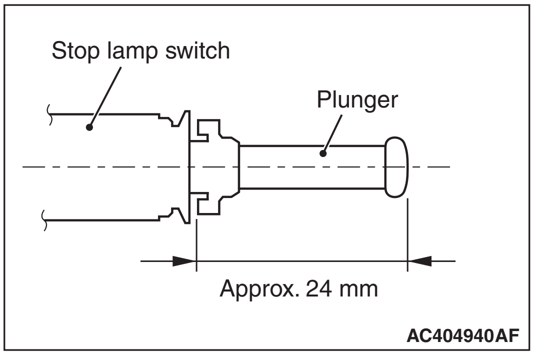
3. Tighten the mounting nuts and bolts in alphabetical order shown in the illustration.

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>>B<< STOP LAMP SWITCH INSTALLATION

⚠ CAUTION

Pulling out the plunger section too frequently may damage the automatic adjustment mechanism section of the stop lamp switch because it is made of plastics. If the plunger section is pulled out at least 2 or 3 times, replace the stop lamp switch.



1. Pull out the plunger section of the stop lamp switch to the maximum length (approx. 24 mm).

   NOTE: The stop lamp switch incorporates the automatic adjustment mechanism for the plunger section.

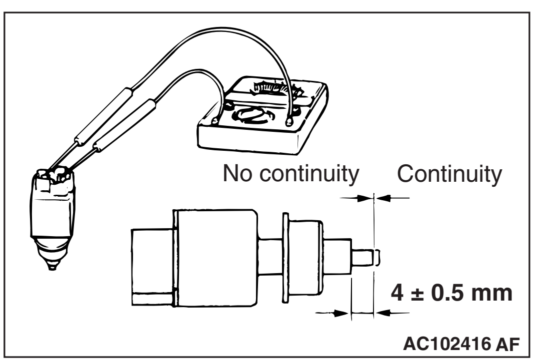
2. Hold the brake pedal to prevent it from moving, and press in the stop lamp switch to the bracket of the brake pedal assembly. Then, turn the stop lamp switch clockwise to install it.

   NOTE: By installing the stop lamp switch as described above, the plunger section is adjusted to the standard value automatically.

INSPECTION <EXCEPT FOR RALLIART VERSION-R>

M1351003500588

STOP LAMP SWITCH CHECK



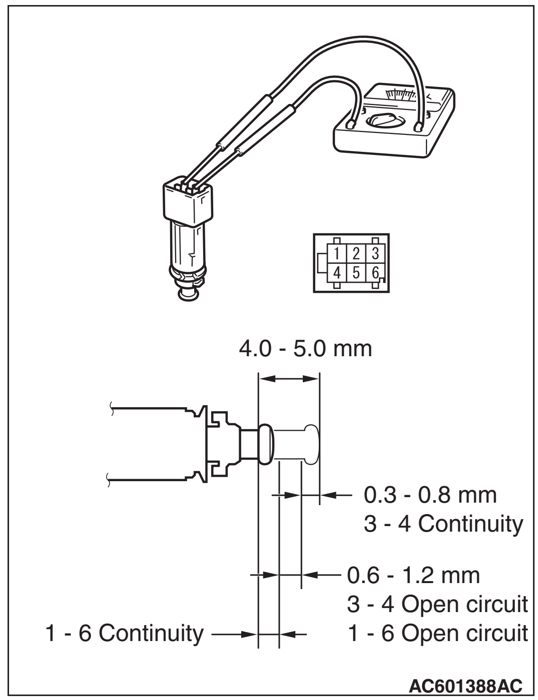
Check for continuity between the terminals of the switch.

Measurement conditions	Terminal connector of tester	Specified condition
When the switch knob is depressed fully	1 - 2	Open circuit
When the switch knob is returned 4 mm or more	1 - 2	Continuity (Less than 2 Ω)

INSPECTION <RALLIART VERSION-R>

M1351003500577

STOP LAMP SWITCH CHECK



Check for continuity between the terminals of the switch.

Inspection status	Terminal number	Normal conditions
Do not press the plunger section (Plunger is extended).	1-6	Open circuit
	3-4	Continuity (Less than 2 Ω)
Press the plunger section fully.	1-6	Continuity (Less than 2 Ω)
	3-4	Open circuit

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MASTER CYLINDER ASSEMBLY AND BRAKE BOOSTER

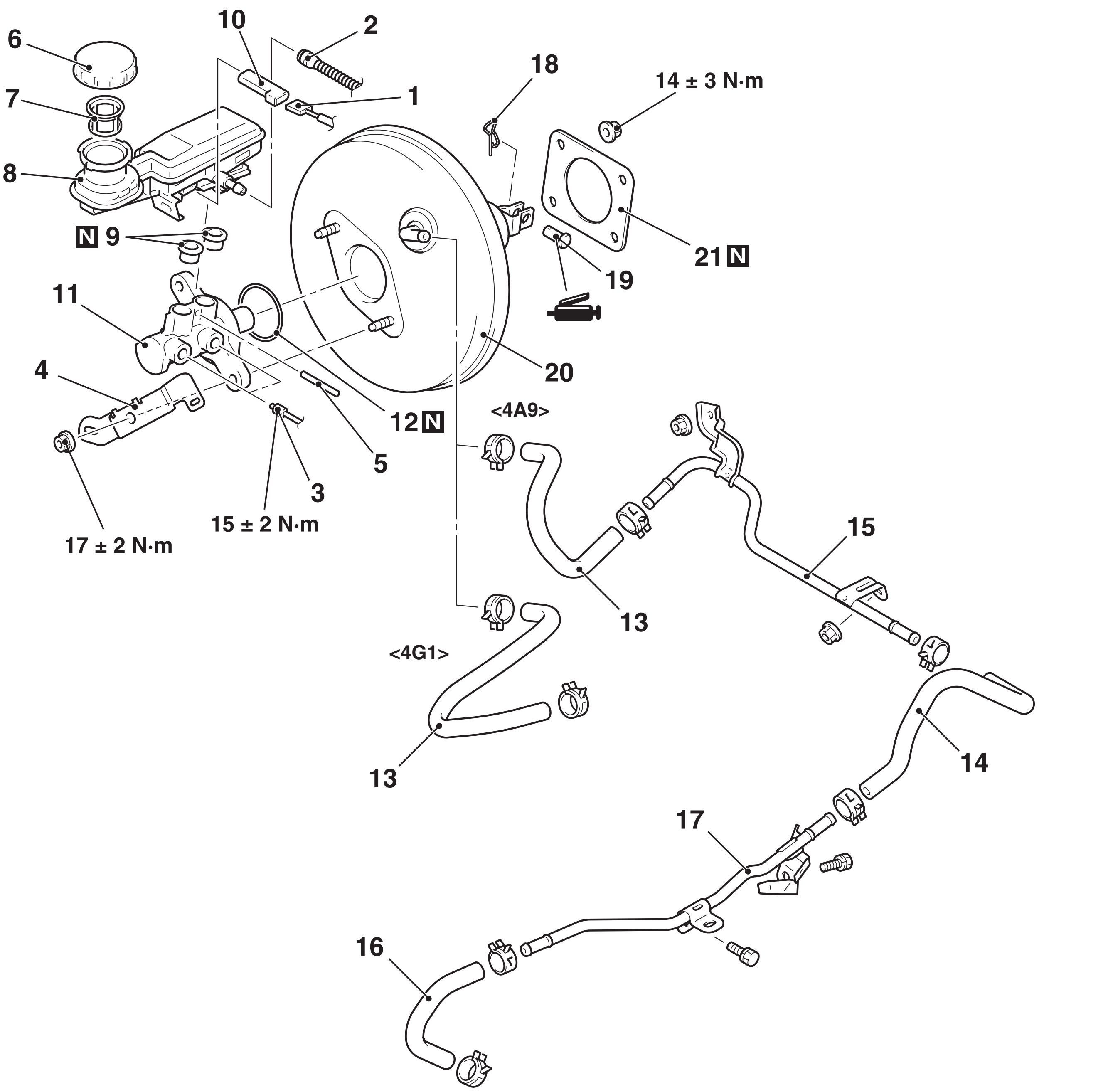
REMOVAL AND INSTALLATION

M1351003701121

⚠ CAUTION

The master cylinder cannot be disassembled. Be careful not to remove the primary piston.

Pre-removal Operation	Post-installation Operation
• Brake Fluid Draining	• Brake Fluid Supplying and Air Bleeding (Refer to P.35A-10). • Brake Pedal Adjustment (Refer to P.35A-7).



Removal steps

1. Brake fluid level switch connector
2. Clutch hose connection <M/T>
3. Brake pipe connection

Removal steps (Continued)

4. Bracket
5. Pin assembly
6. Reservoir cap

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Removal steps (Continued)

7. Reservoir filter
8. Reservoir assembly
9. Reservoir seal
10. Brake fluid level switch
11. Brake master cylinder assembly
12. O-ring

>>**B**<< 13. Vacuum hose (with built-in check valve)

- Inlet manifold assembly <4G1> (Refer to GROUP 15, Inlet Manifold P.15-12).

>>**A**<< 14. Vacuum hose <4A9>

15. Vacuum pipe <4A9>

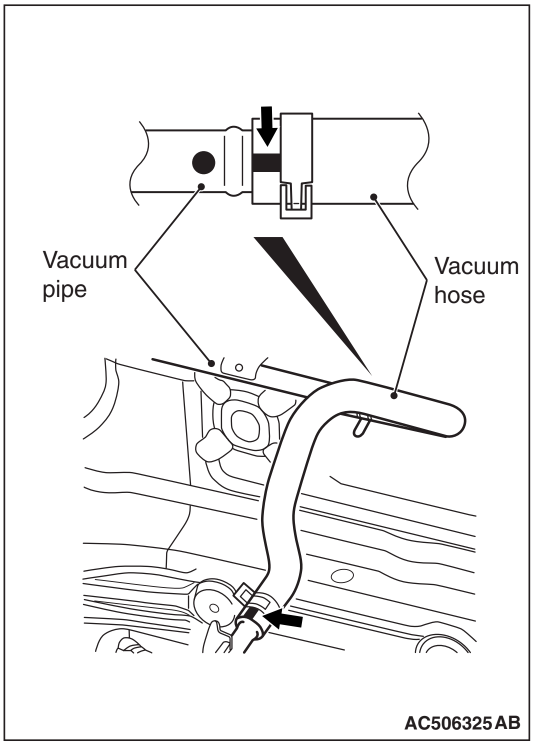
>>**A**<< 16. Vacuum hose <4A9>

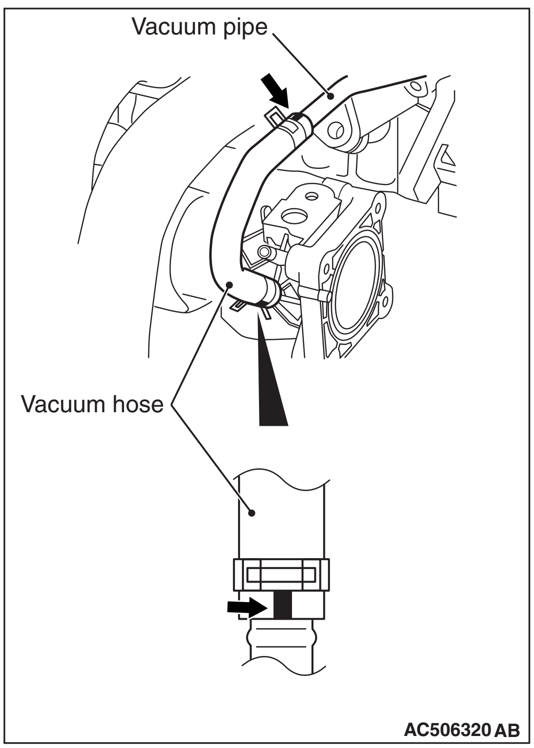
17. Vacuum pipe <4A9>
18. Snap pin
19. Pin
20. Brake booster assembly
21. Sealer

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INSTALLATION SERVICE POINTS

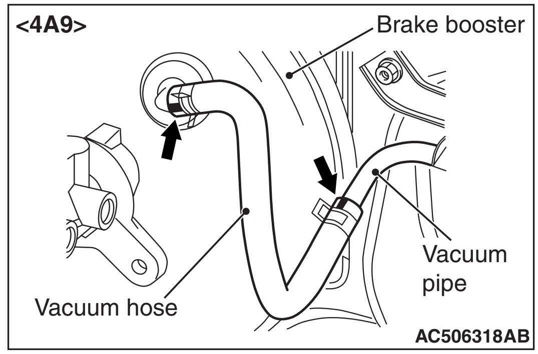
>>A<< VACUUM HOSE CONNECTION <4A9>

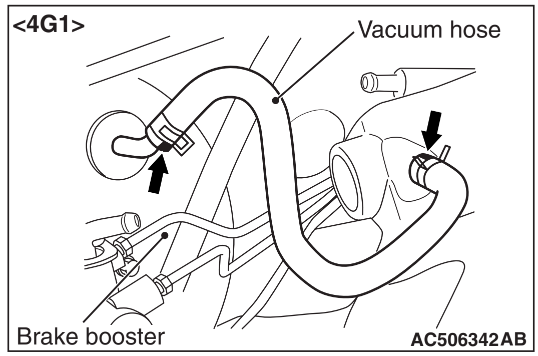




Install the vacuum hose with its marking located as shown in the figure.

>>B<< VACUUM HOSE (WITH BUILT-IN CHECK VALVE) CONNECTION





Install the vacuum hose (with built-in check valve) with its marking located as shown in the figure.

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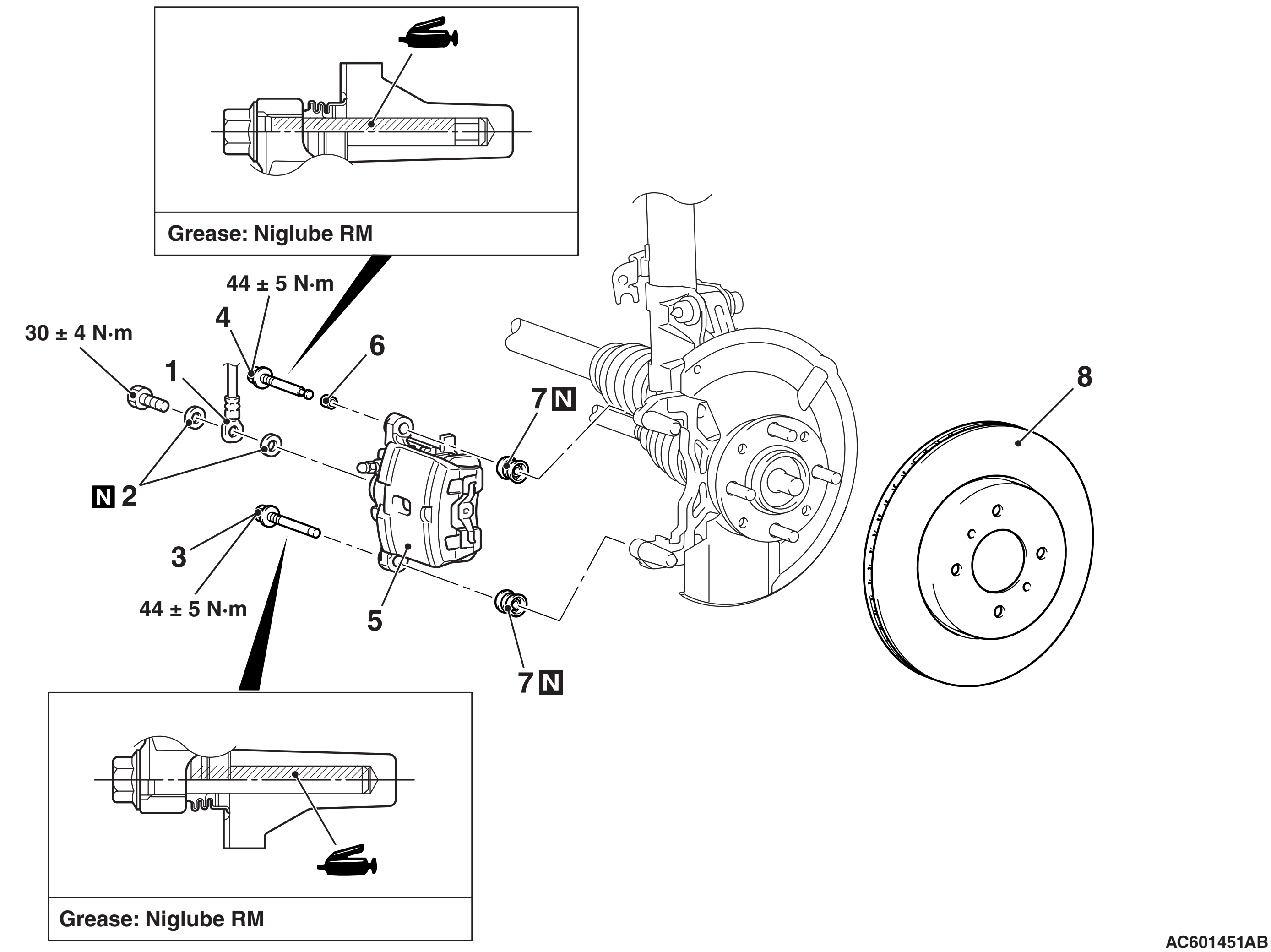
FRONT DISC BRAKE ASSEMBLY

REMOVAL AND INSTALLATION <14-INCH>

M1351006000924

⚠ CAUTION

Do not wipe off the special grease that is on the lock pin and guide pin or allow it to contaminate the lock pin and guide pin.



AC601451AB

Removal steps

- • Brake fluid draining
- 1. Connection between brake hose and brake caliper
- 2. Gasket
- 3. Guide pin
- 4. Lock pin
- 5. Brake caliper assembly
- 6. Bushing
- 7. Pin boot
- <<**A**>> 8. Brake disc

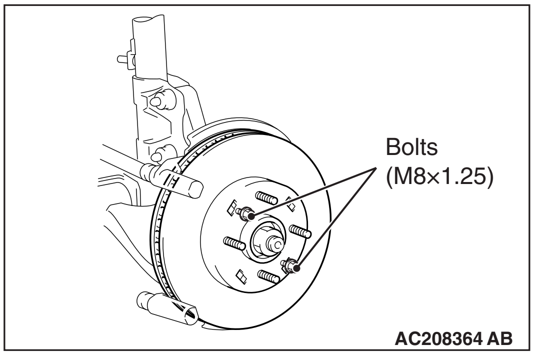
Installation steps

- 8. Brake disc
- >>**A**<< 7. Pin boot
- 6. Bushing
- >>**B**<< 5. Brake caliper assembly
- >>**C**<< 4. Lock pin
- >>**C**<< 3. Guide pin
- 2. Gasket
- >>**D**<< 1. Brake hose connection
- • Brake fluid supplying and air bleeding (Refer to P.35A-10).
- >>**E**<< • Brake drag force check

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REMOVAL SERVICE POINT

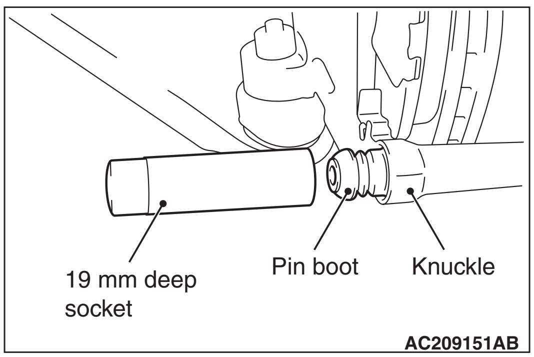
<<A>> BRAKE DISC REMOVAL



If the brake disc is seized, install a M8 x 1.25 bolts as shown, and remove the disc by tightening the bolts evenly and gradually.

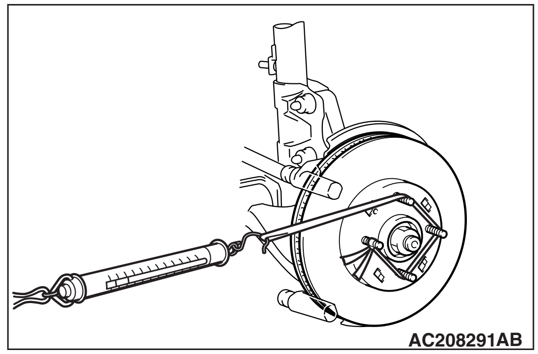
INSTALLATION SERVICE POINTS

>>A<< PIN BOOT INSTALLATION



Use a 19-mm deep socket to press the pin boot into the knuckle.

>>B<< BRAKE CALIPER ASSEMBLY INSTALLATION



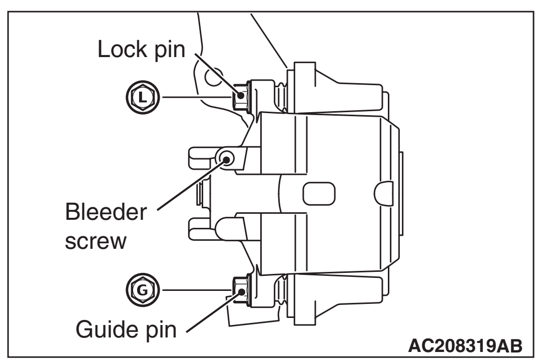
1. In order to measure the brake drag torque, measure the hub torque with the pads removed by the following procedure.
   (1) Use a spring balance to measure the hub torque in the forward direction.
   (2) Record hub torque with pads removed.

⚠ CAUTION

Do not let any oil, grease or other contamination get onto the friction surfaces of the pads and brake discs.

2. Assemble the pad and wear indicator assembly, the pad clip and the shim to the knuckle, and then the outer pad and shim to the caliper body.
3. Install the caliper assembly, being careful not to pinch the piston boot.

>>C<< LOCK PIN/GUIDE PIN INSTALLATION

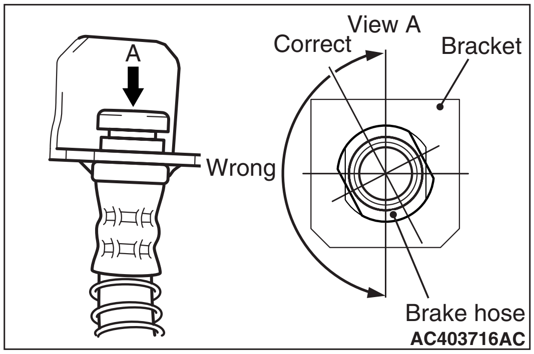


Install the lock pin to the bleeder screw side of the caliper body, and the guide pin to the opposite side.

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>>D<< BRAKE HOSE INSTALLATION

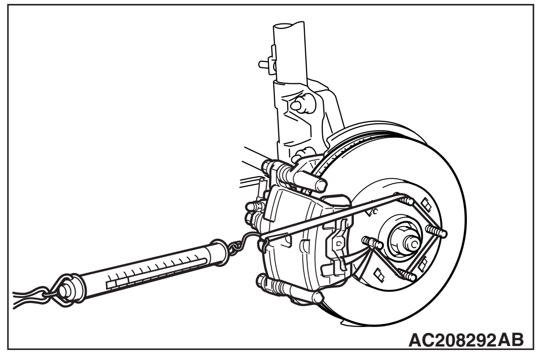
1. Install the brake hose end on the bracket and another end on the front brake assembly.



2. Twist the brake hose towards the lesser torsion between the brake hose and bracket as shown and secure it to the bracket.

>>E<< BRAKE DRAG FORCE CHECK

1. Check the brake drag force as follows.
   (1) Start the engine and hold the brake pedal down for 5 seconds. (Pedal depression force: approximately 200 N)
   (2) Stop the engine.
   (3) Turn the brake disc forward 10 times.



   (4) Use a spring balance to measure the hub torque with pads installed in the same direction as earlier.
   (5) Calculate the drag force of the disc brake [difference between hub torque with pads installed and hub torque with pads removed].

   Standard value: 46 N or less

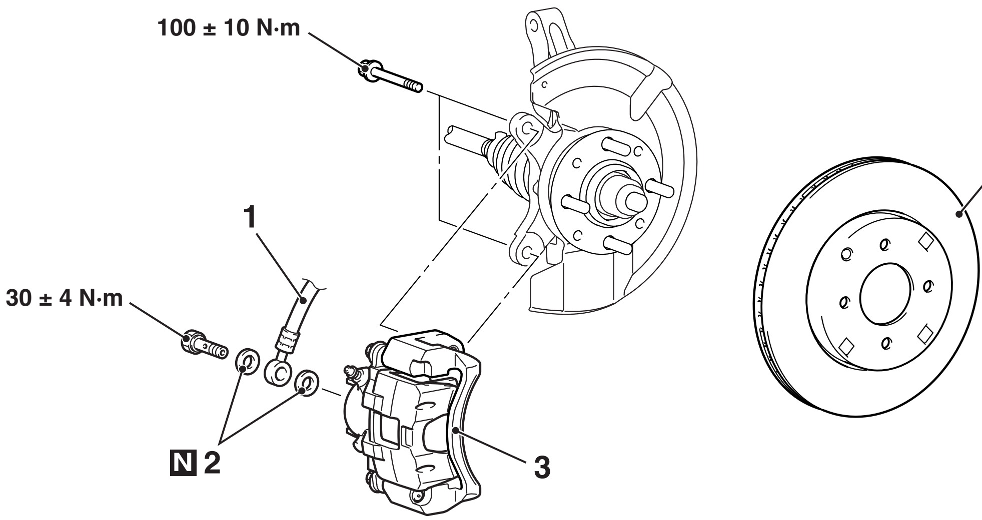
2. If the brake drag force exceeds the standard value, disassemble and clean the piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.

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REMOVAL AND INSTALLATION <15-INCH (VR-X)>

M1351006000935

Pre-removal Operation	Post-installation Operation
Brake fluid draining	Brake fluid refilling and air bleeding (Refer to P.35A-10).



Removal steps

>>**B**<< 1. Connection between brake hose and brake caliper
2. Gasket

Removal steps (Continued)

>>**A**<< 3. Brake caliper assembly
4. Brake disc

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Group TOC

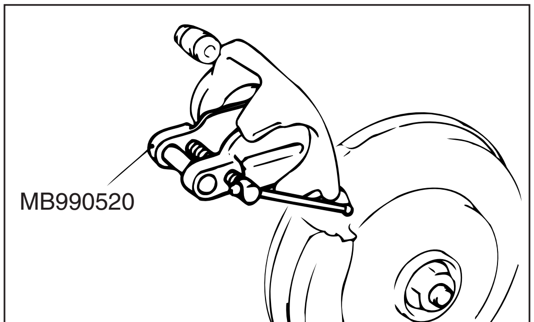
INSTALLATION SERVICE POINTS

>>A<< BRAKE CALIPER ASSEMBLY INSTALLATION

1. In order to measure the brake drag force after pad installation, measure the hub sliding torque in the forward direction (with no pad attached) using a spring balance.

⚠ CAUTION

Keep grease or other fouling off the pad and brake disc friction surface.

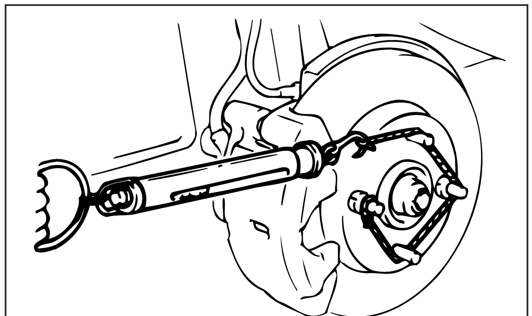


AC102474 AB

2. Clean the piston, and press the piston into the cylinder using the special tool, piston expander (MB990520).
3. Assemble the pad clip and pad to the caliper support, and tighten the slide pin bolt to the specified torque.

   Tightening torque: 49 ± 4 N·m

4. Start the engine, and depress the brake pedal forcibly two or three times. Then stop the engine.
5. Rotate the brake disc 10 turns in the forward direction.



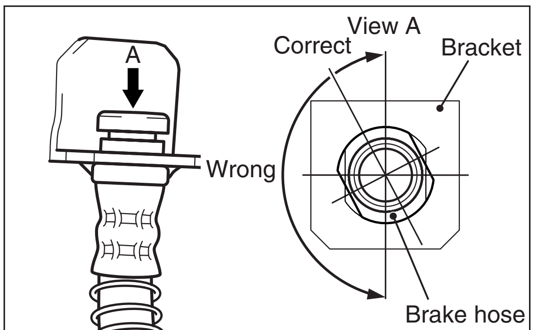
AC210114AB

6. Using a spring balance, measure the hub sliding torque in the forward direction.
7. Obtain the disc brake drag force (difference between measured values of item 1 and item 6).

   Standard value: 83 N or less.

8. If the brake drag force exceeds the standard value, disassemble the piston to check for fouling/rust on the piston sliding section and piston/seal deterioration, and confirm whether the slide pin slides properly.

>>B<< BRAKE HOSE INSTALLATION



AC403716AC

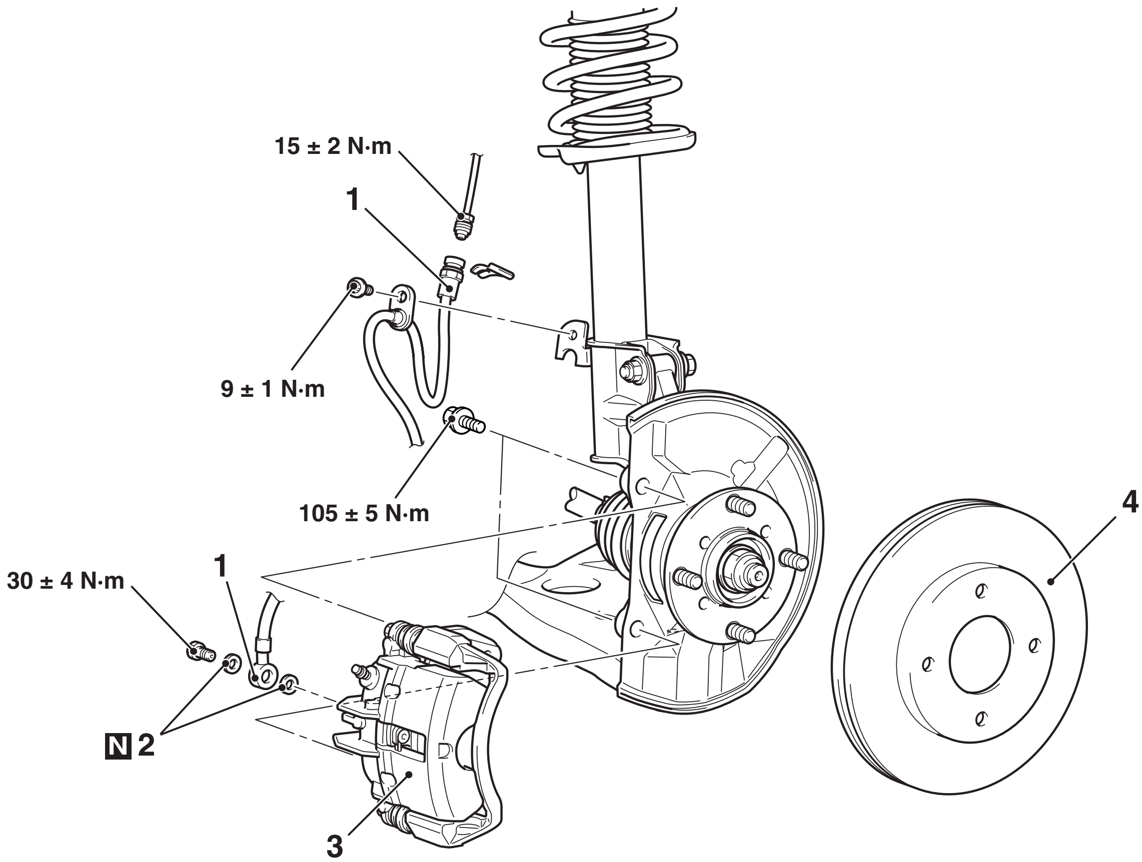
Twist the brake hose towards the lesser torsion between the brake hose and body bracket as shown, and secure it to the body bracket.

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REMOVAL AND INSTALLATION <15-INCH (RALLIART Version-R)>

M1351006000957

Pre-removal Operation	Post-installation Operation
Brake fluid draining	Brake fluid refilling and air bleeding (Refer to P.35A-10).



Removal steps

1. Connection between brake hose and brake caliper
2. Gasket

Removal steps (Continued)

>>**A**<< 3. Brake caliper assembly
4. Brake disc

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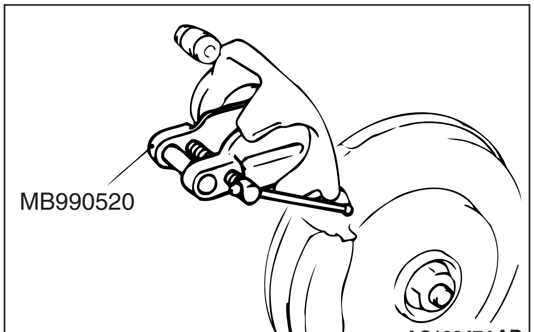
INSTALLATION SERVICE POINTS

>>A<< BRAKE CALIPER ASSEMBLY INSTALLATION

1. In order to measure the brake drag force after pad installation, measure the hub sliding torque in the forward direction (with no pad attached) using a spring balance.

⚠ CAUTION

Keep grease or other fouling off the pad and brake disc friction surface.

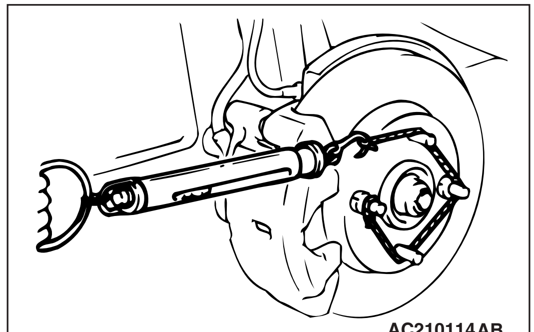


AC102474 AB

2. Clean the piston, and press the piston into the cylinder using the special tool, piston expander (MB990520).
3. Assemble the pad clip and pad to the caliper support, and tighten the slide pin bolt to the specified torque.

   Tightening torque: 28 ± 2 N·m

4. Start the engine, and depress the brake pedal forcibly two or three times. Then stop the engine.
5. Rotate the brake disc 10 turns in the forward direction.



AC210114 AB

6. Using a spring balance, measure the hub sliding torque in the forward direction.
7. Obtain the disc brake drag force (difference between measured values of item 1 and item 6).

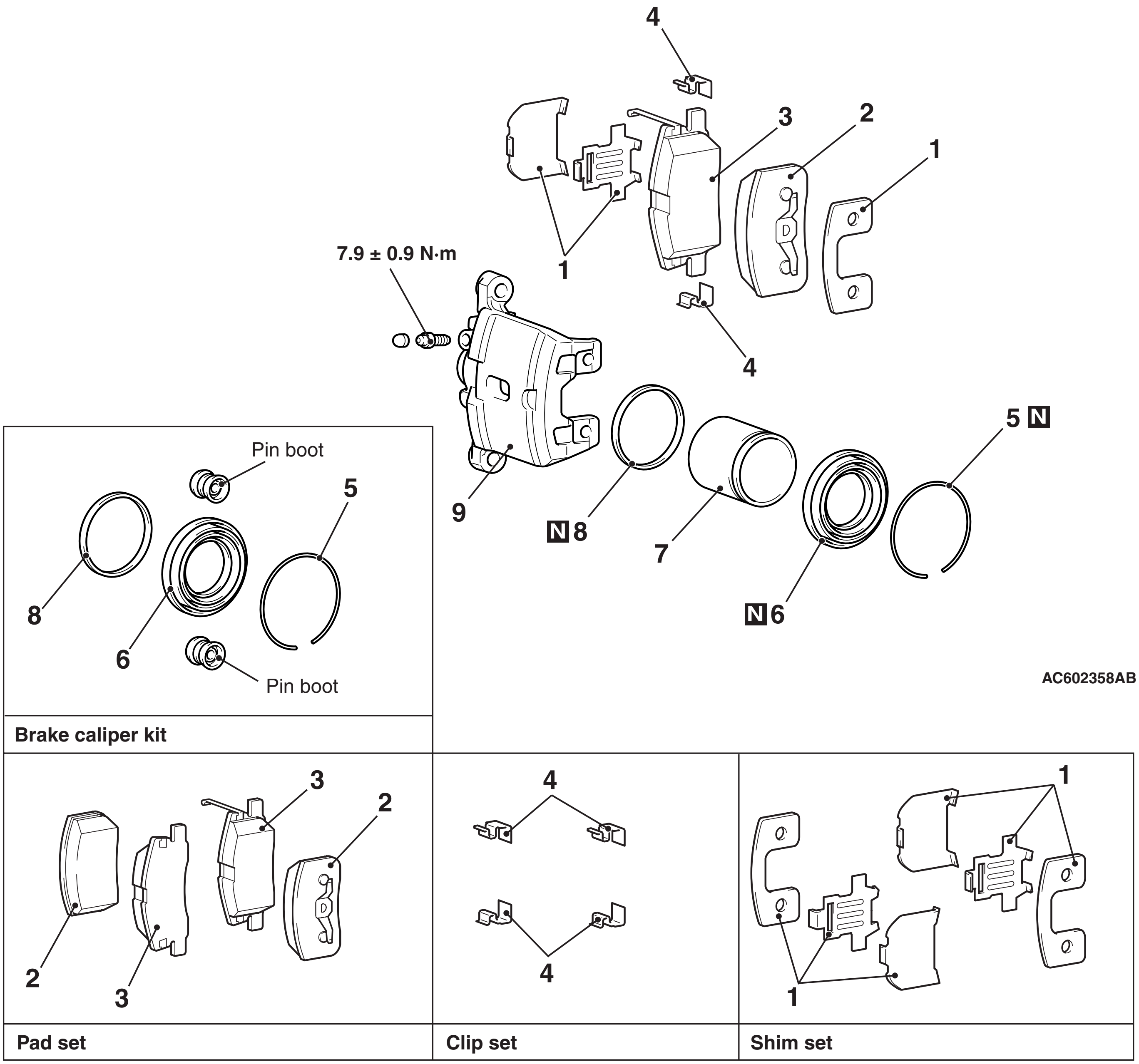
   Standard value: 95 N or less

8. If the brake drag force exceeds the standard value, disassemble the piston to check for fouling/rust on the piston sliding section and piston/seal deterioration, and confirm whether the slide pin slides properly.

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DISASSEMBLY AND REASSEMBLY <14-INCH>

M1351006201017



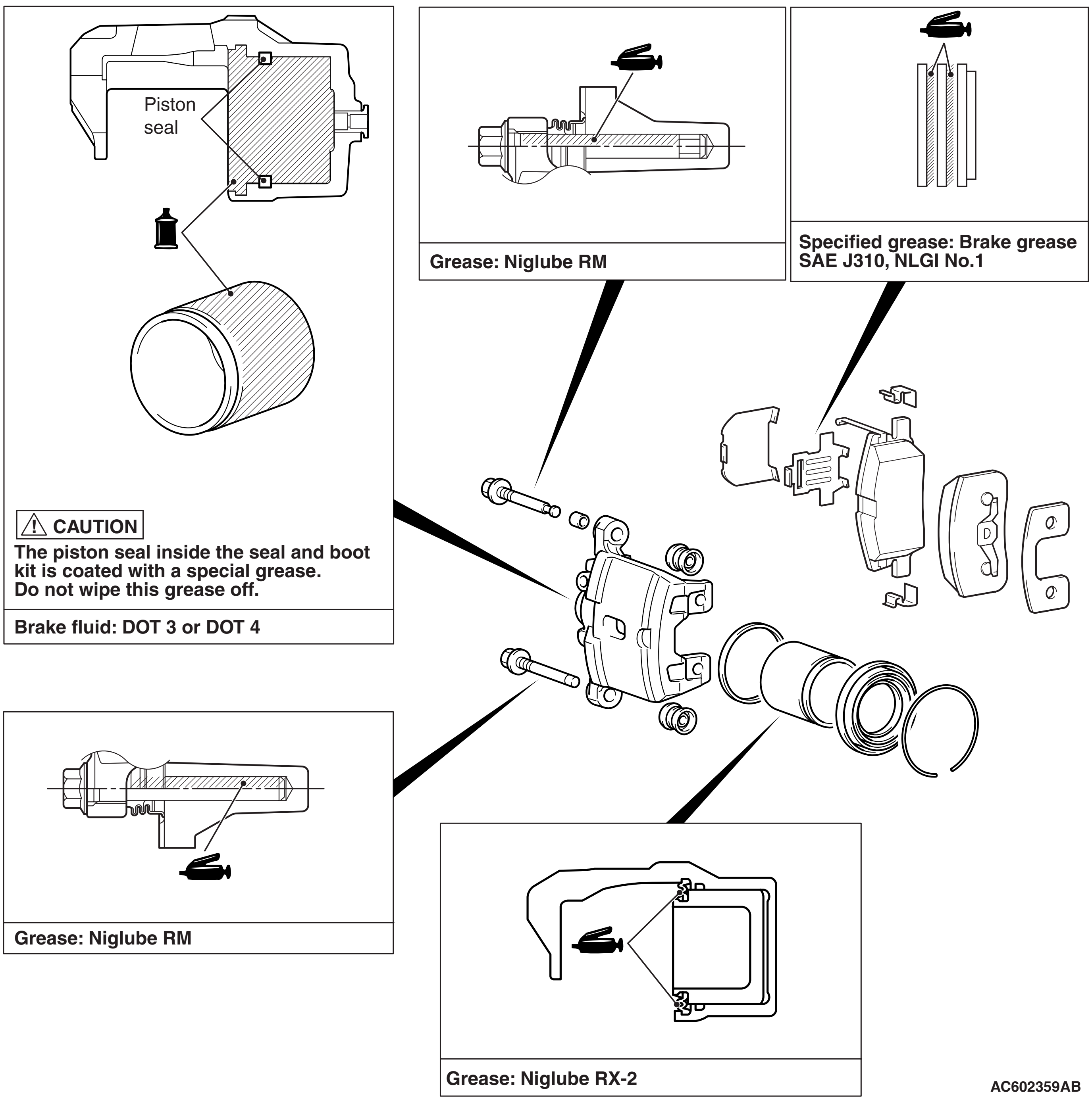
Disassembly steps

1. Shim
2. Outer pad
3. Pad assembly <RH>, pad and wear indicator assembly <LH>
4. Pad clip
5. Boot ring

Disassembly steps (Continued)

<<**A**>> 6. Piston boot
<<**A**>> 7. Piston
<<**B**>> 8. Piston seal
9. Caliper body

LUBRICATION POINTS



DISASSEMBLY SERVICE POINTS

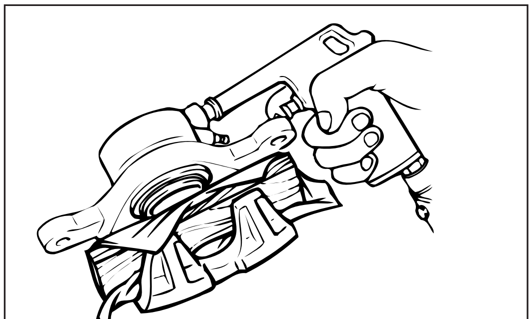
When disassembling the disc brakes, disassemble both sides (left and right) as a set.

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<<A>> PISTON BOOT/PISTON REMOVAL

⚠ CAUTION

Blow air little by little to remove the pistons. The pistons will rush out if a force of air is applied suddenly.



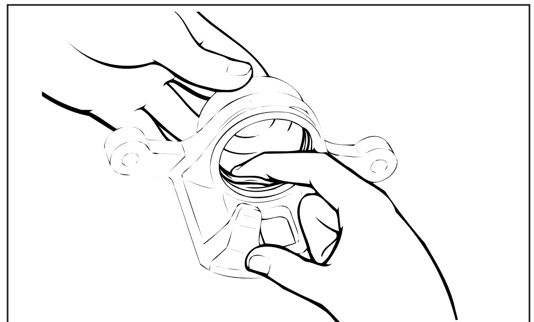
ACX00697

Place a piece of wood, etc. against the caliper body as shown. Blow compressed air through the brake hose to remove the piston boot and piston.

<<B>> PISTON SEAL REMOVAL

⚠ CAUTION

Do not use a flat-tipped screwdriver or similar tool to remove the piston seal. These may damage the inner side of the cylinder.



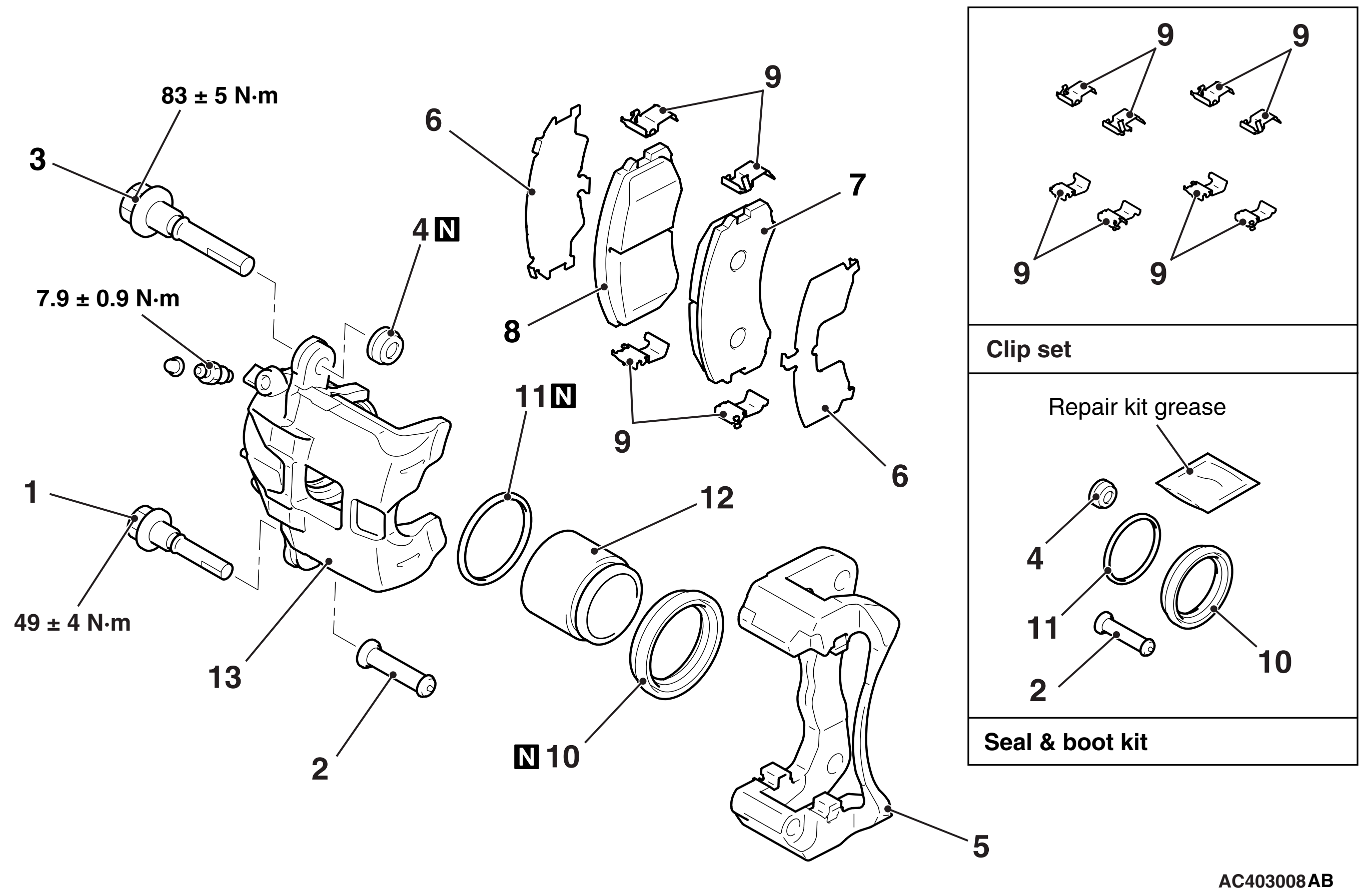
ACX00689

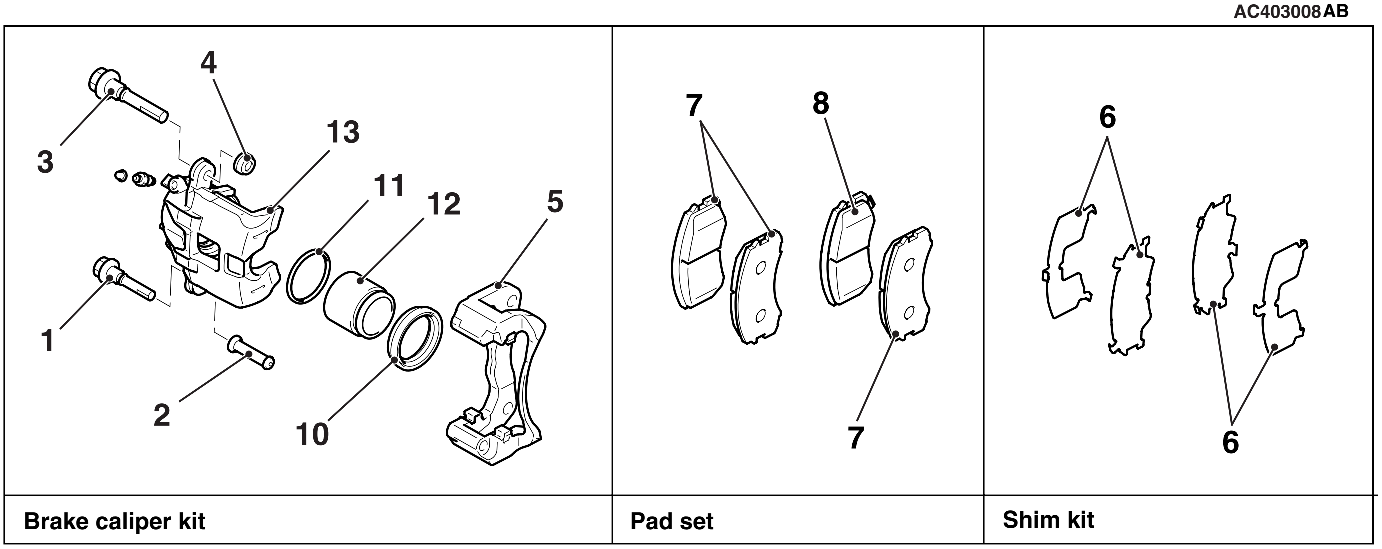
1. Remove the piston seal with your finger tip.
2. Clean the piston surface and inner cylinder with alcohol or brake fluid DOT 3 or DOT 4.

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DISASSEMBLY AND REASSEMBLY <15-INCH (VR-X)>

M1351006200984





Disassembly steps

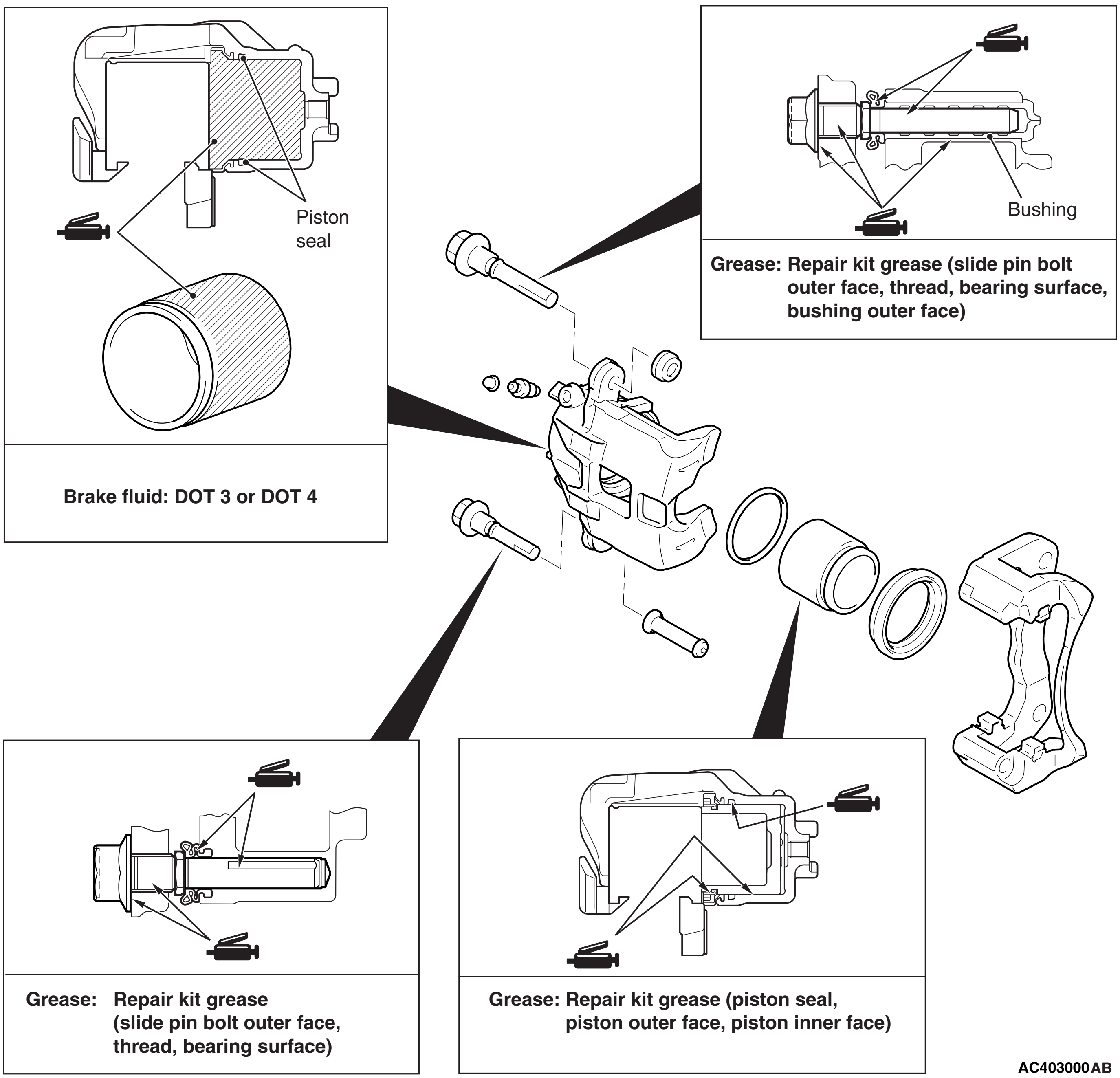
1. Slide pin bolt (sub)
2. Bushing
3. Slide pin bolt (main)
4. Pin boot
5. Torque member
6. Shim
7. Pad assembly

Disassembly steps (Continued)

8. Pad and wear indicator assembly (LH)
9. Pad clip
10. <<A>> Piston boot
11. <<B>> Piston seal
12. <<A>> Piston
13. Caliper body

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LUBRICATION POINTS



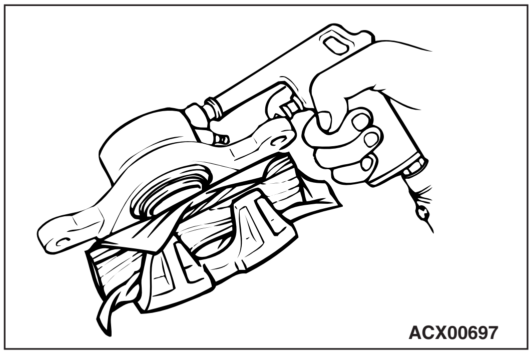
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DISASSEMBLY SERVICE POINT

<<A>> PISTON BOOT/PISTON REMOVAL

⚠ CAUTION

Blow air little by little to remove the pistons. The pistons will rush out if a force of air is applied suddenly.



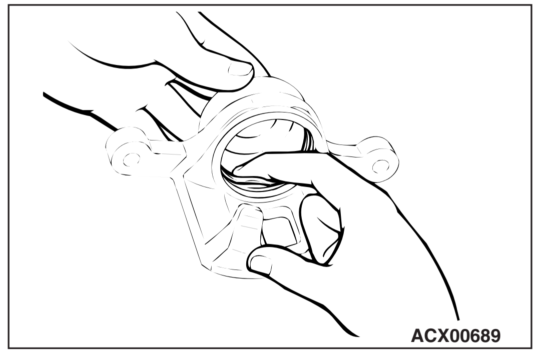
ACX00697

Cover the caliper body outer side with a cloth or other material. Blow compressed air through the brake hose installation area to remove the piston and piston boot.

<<B>> PISTON SEAL REMOVAL

⚠ CAUTION

Do not use a flat-tipped screwdriver to remove the piston seal. This may damage the inner side of the cylinder.



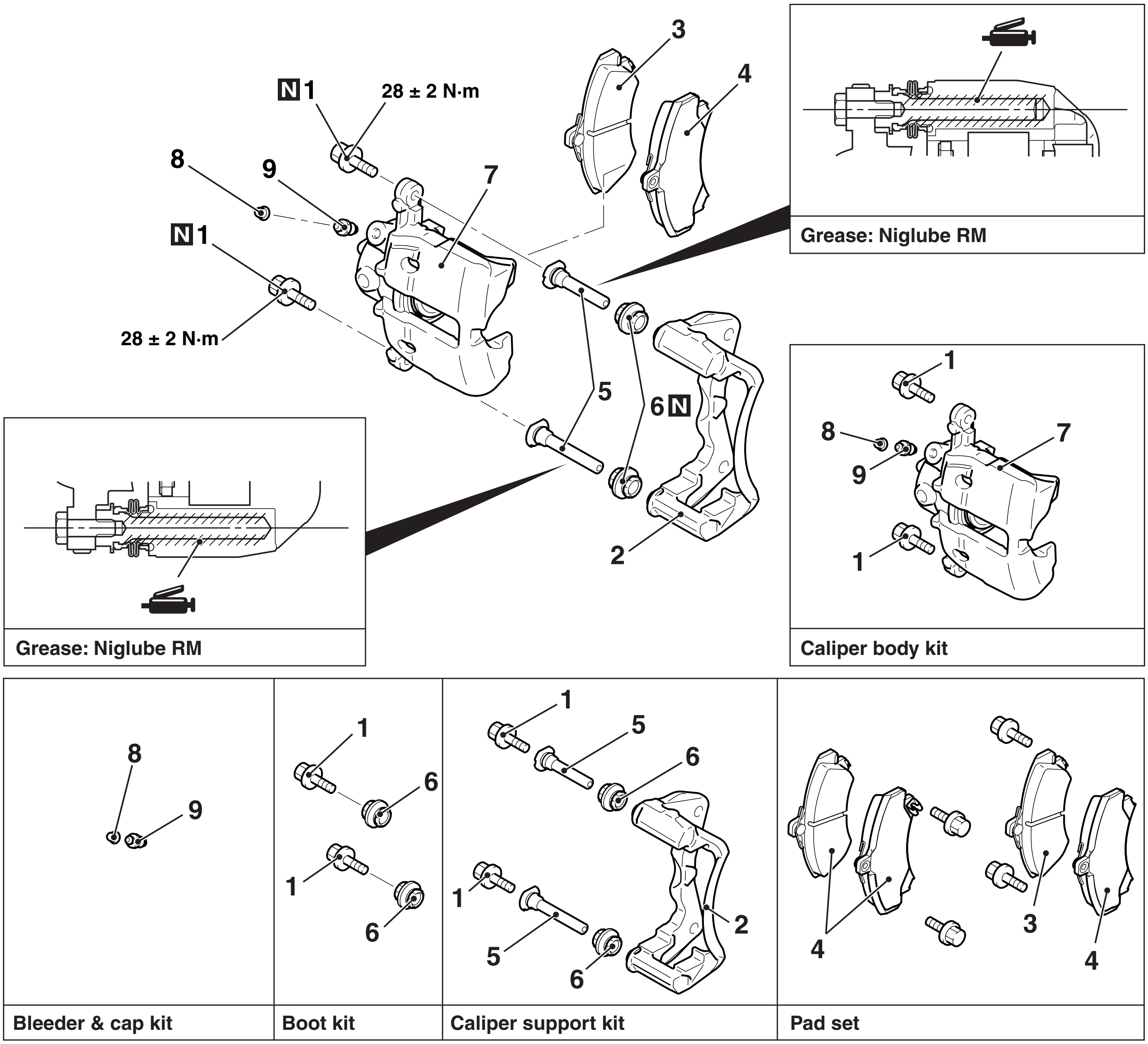
ACX00689

1. Remove the piston seal with your finger tip.
2. Clean the piston surface and inner cylinder with alcohol or brake fluid DOT 3 or DOT 4.

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DISASSEMBLY AND REASSEMBLY <15-INCH (RALLIART Version-R)>

M1351006200995



AC601128AC

Disassembly steps

1. Bolt
2. Caliper support
3. Pad and wear indicator assembly
4. Pad assembly
5. Guide pin

Disassembly steps (Continued)

6. Boot
7. Caliper body
8. Bleeder cap
9. Bleed screw

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INSPECTION

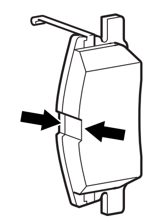
M1351006300624

- Check the cylinder for wear, damage or rust.
- Check the piston surface for wear, damage or rust.
- Check the caliper body or sleeve for wear.
- Check the pad for damage or adhesion of grease, check the backing metal for damage.

PAD WEAR CHECK

WARNING

- ***Always replace both brake pads on each wheel as a set (both front wheels or both rear wheels). Failure to do so will result in uneven braking, which may cause unreliable brake operation.***
- ***If there is significant difference in the thickness of the pads on the left and right sides, check the sliding condition of the piston and slide pins.***



AC209106

1. Measure thickness at the thinnest and most worn area of the pad.

   Standard value:
   <LS, VR, VR-X>: 10.0 mm
   <RALLIART Version-R>: 10.5 mm

   Minimum limit:
   <LS, VR, VR-X>: 2.0 mm
   <RALLIART Version-R>: 1.5 mm

2. Replace the pad assembly if pad thickness is less than the limit value.

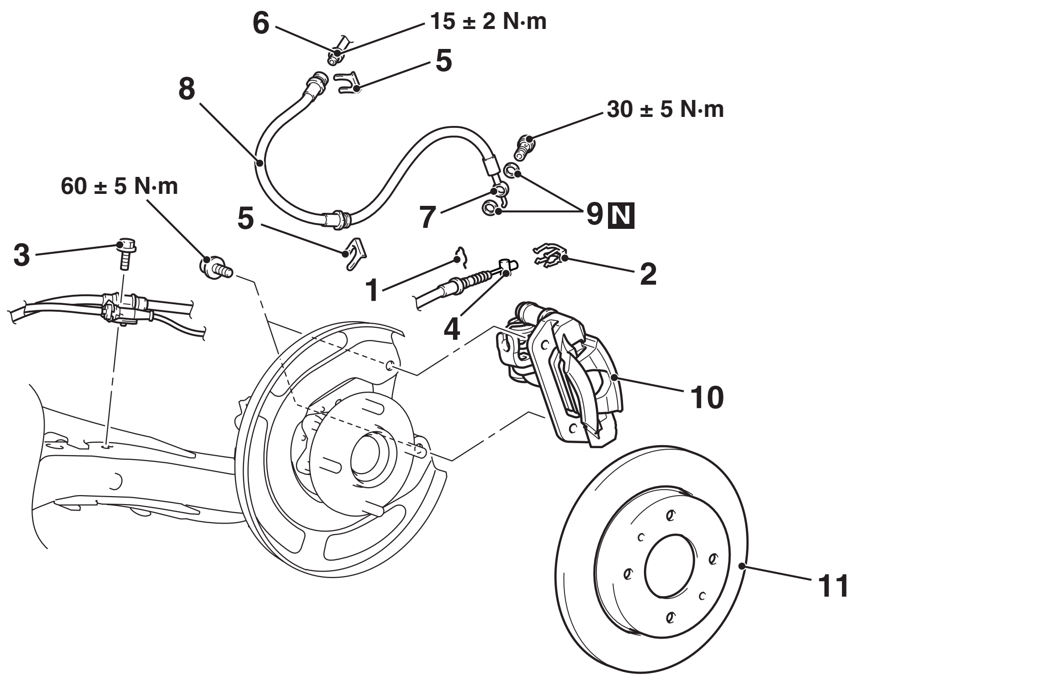
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REAR DISC BRAKE ASSEMBLY <VR-X, RALLIART Version-R>

REMOVAL AND INSTALLATION <VR-X>

M1351007000637

Pre-removal Operation	**Post-installation Operation**
Brake fluid draining	Brake fluid refilling and air bleeding (Refer to P.35A-10).



AC403305AB

Removal steps

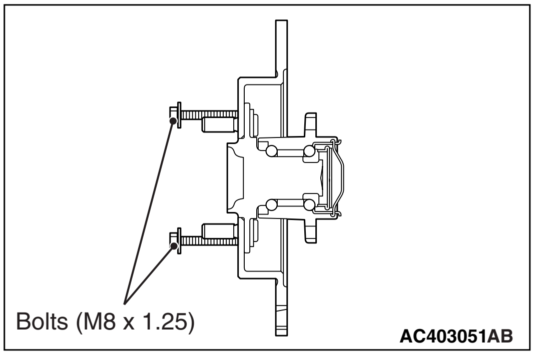
1. Clip
2. Cable retainer
3. Bolt
4. Connection between parking brake rear cable and rear brake caliper assembly
5. Clip

Removal steps (Continued)

6. Connection between brake pipe and brake hose
7. Connection between brake hose and rear brake caliper assembly
8. Brake hose
9. Gasket
10. >>**A**<< Rear brake caliper assembly
11. <<**A**>> Rear brake disc

REMOVAL SERVICE POINT

<<A>> REAR BRAKE DISC REMOVAL

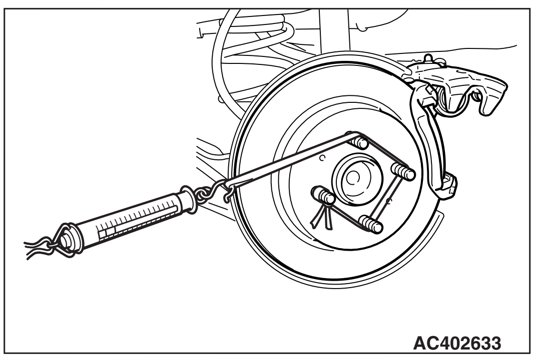


If the rear brake disc is seized, install M8 × 1.25 mm bolts as shown, and remove the disc by tightening the both bolts evenly and gradually.

INSTALLATION SERVICE POINT

>>A<< REAR BRAKE CALIPER ASSEMBLY INSTALLATION

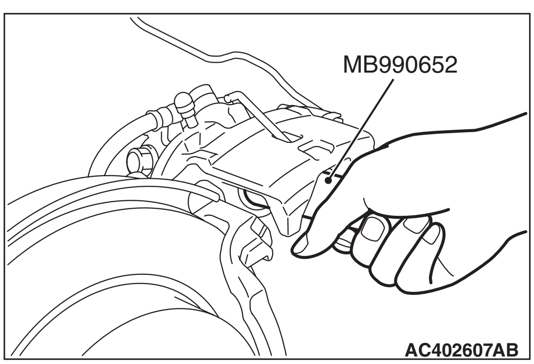
Measure the brake drag force in the following procedure.



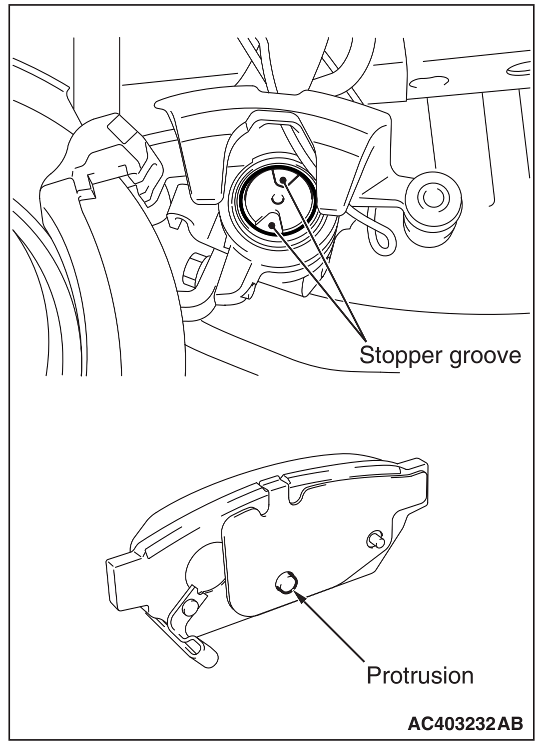
1. Using a spring balance, measure the hub sliding torque in the forward direction.

⚠ CAUTION

Keep grease or other fouling off the pad and brake disc friction surface.



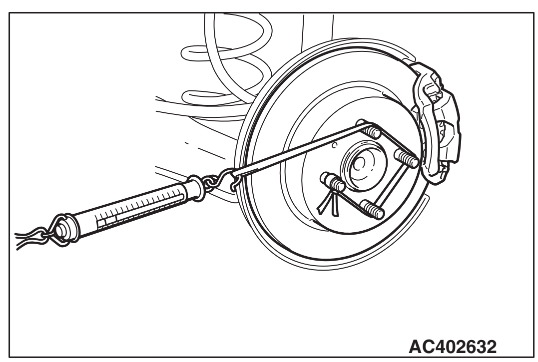
2. Clean the piston, and press the piston into the cylinder using the special tool, disc brake piston driver (MB990652).
3. Install the caliper support to the backing plate assembly, and assemble the pad clip and pad to the caliper support.



4. Set as shown so that the protrusion on the pad assembly rear face is engaged in the piston stopper groove.
5. Lower the caliper assembly while taking care not to catch the piston boot, and tighten the bolt to the specified torque.

   Tightening torque: 27 ± 4 N·m

6. Start the engine, and depress the brake pedal forcibly two or three times. Then stop the engine.
7. Rotate the brake disc 10 turns in the forward direction.



8. Using a spring balance, measure the hub sliding torque in the forward direction.
9. Obtain the disc brake drag force (difference between measured values of item 1 and item 7).

   Standard value: 46 N or less.

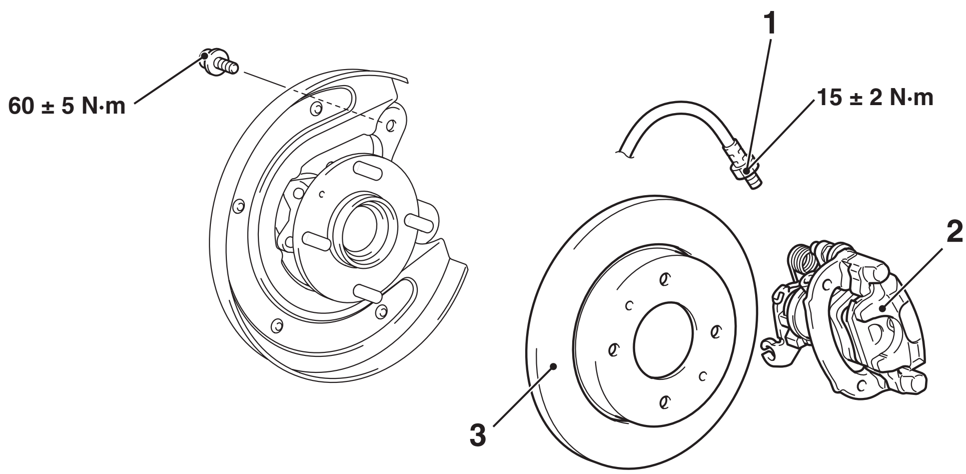
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10. If the brake drag force exceeds the standard value, disassemble the piston to check for fouling/rust on the piston sliding section and piston/seal deterioration, and confirm whether the slide pin slides properly.

REMOVAL AND INSTALLATION <RALLIART VERSION-R>

M1351007000648

Pre-removal Operation	Post-installation Operation
Brake fluid draining	Brake fluid refilling and air bleeding (Refer to P.35A-10).



AC312919AC

Removal steps

- Connection between parking brake rear cable and rear brake caliper assembly

1. Connection between brake hose and rear brake caliper assembly

Removal steps (Continued)

>>**A**<< 2. Rear brake caliper assembly

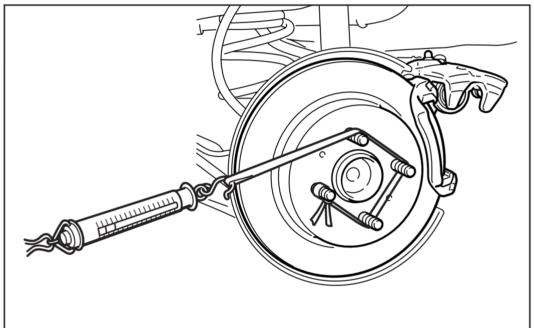
3. Rear brake disc

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INSTALLATION SERVICE POINT

>>A<< REAR BRAKE CALIPER ASSEMBLY INSTALLATION

Measure the brake drag force in the following procedure.

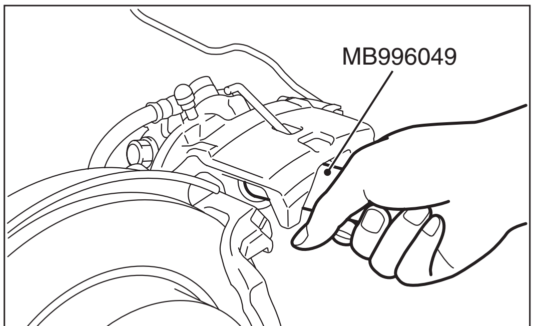


AC402633

1. Using a spring balance, measure the hub sliding torque in the forward direction.

⚠ CAUTION

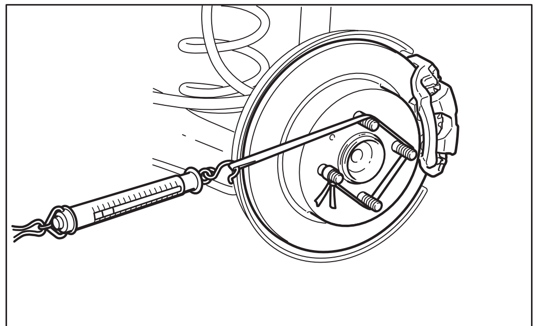
Keep grease or other fouling off the pad and brake disc friction surface.



AC402607AD

2. Clean the piston, and press the piston into the cylinder using the special tool, disc brake piston driver (MB996049).
3. Install the caliper support to the backing plate assembly, and assemble the pad clip and pad to the caliper support.
4. Lower the caliper assembly while taking care not to catch the piston boot, and tighten the bolt to the specified torque.

   Tightening torque: 28 ± 2 N·m
5. Start the engine, and depress the brake pedal forcibly two or three times. Then stop the engine.
6. Rotate the brake disc 10 turns in the forward direction.



AC402632

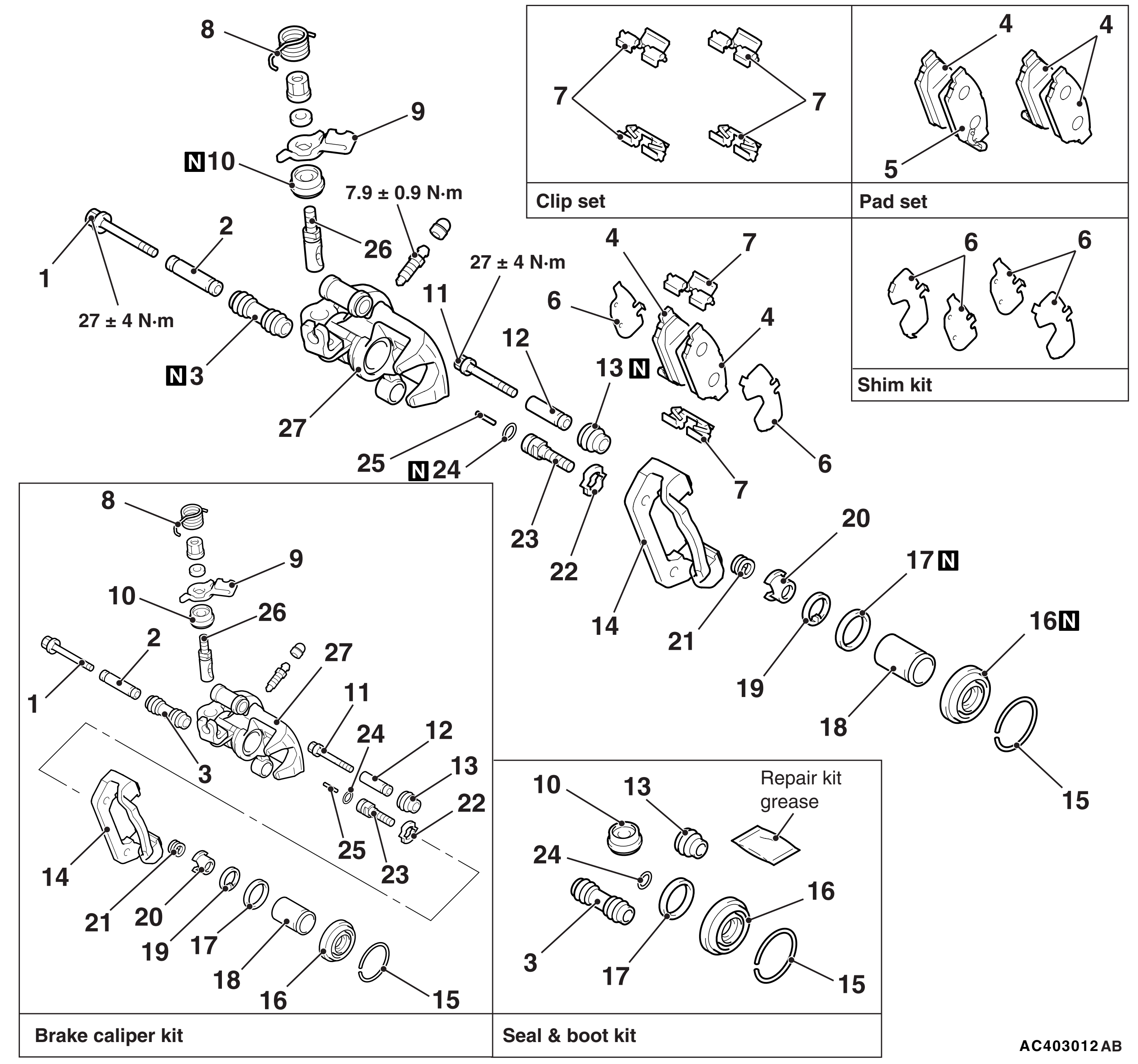
7. Using a spring balance, measure the hub sliding torque in the forward direction.
8. Obtain the disc brake drag force (difference between measured values of item 1 and item 7).

   Standard value: 46 N or less
9. If the brake drag force exceeds the standard value, disassemble the piston to check for fouling/rust on the piston sliding section and piston/seal deterioration, and confirm whether the slide pin slides properly.

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DISASSEMBLY AND REASSEMBLY <VR-X>

M1351007200619



Disassembly steps

1. Lock pin
2. Sleeve
3. Sleeve boot
4. Pad assembly
5. Pad and wear indicator assembly
6. Shim
7. Clip
8. Return spring
9. Parking brake lever
10. Lever boot
11. Guide pin
12. Guide pin sleeve
13. Guide pin boot

Disassembly steps (Continued)

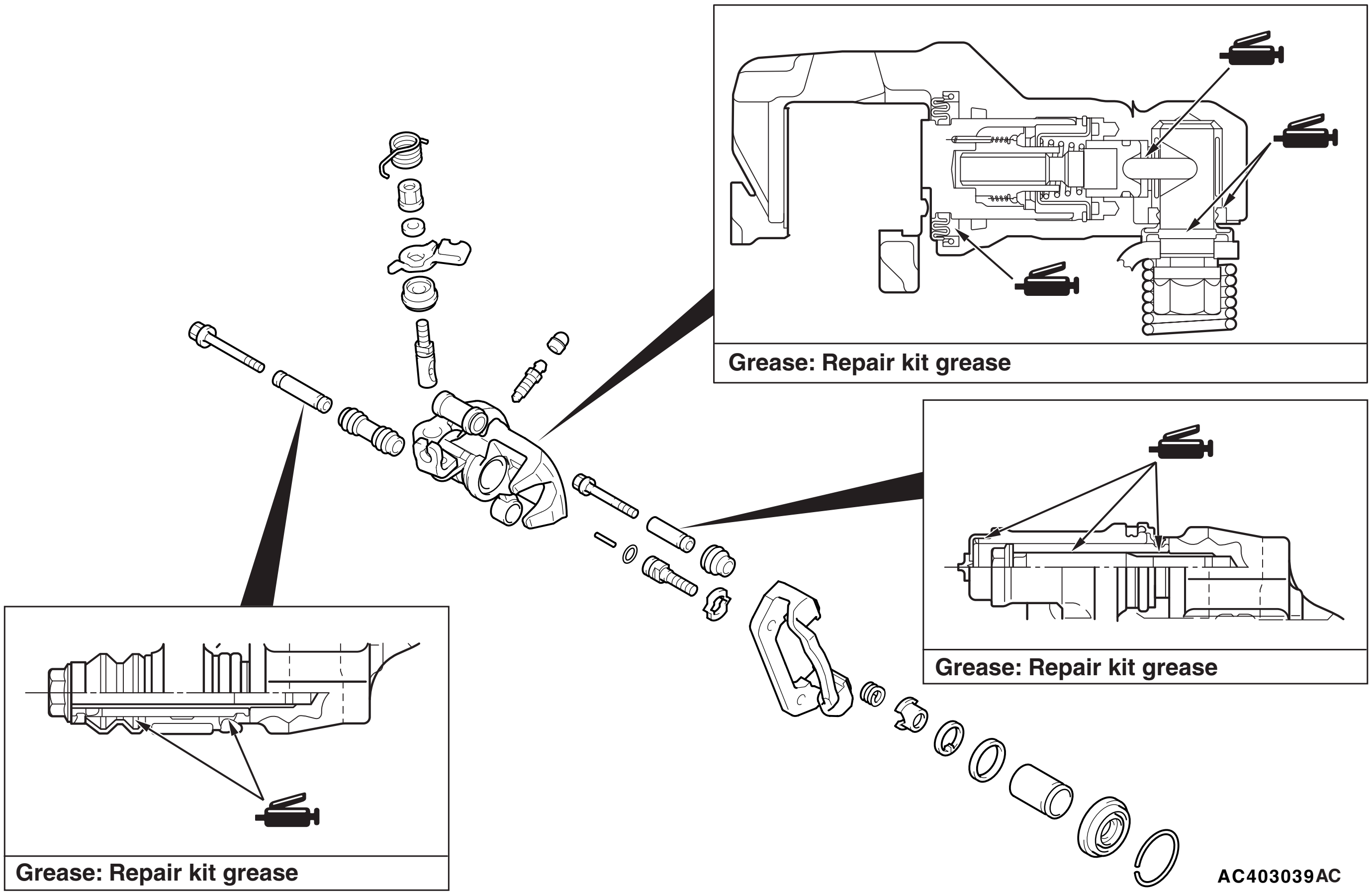
14. Support mounting
15. Boot ring
16. <<A>> Piston boot
17. <<B>> Piston seal
18. <<A>> >>B<< Piston
19. <<C>> >>A<< Snap ring
20. Snap case
21. Return spring
22. Stopper
23. Adjuster spindle
24. O-ring
25. Connecting link

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Disassembly steps (Continued)

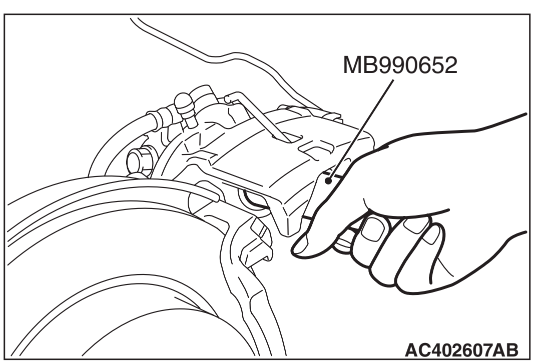
26. Spindle lever
27. Caliper body

LUBRICATION POINTS



DISASSEMBLY SERVICE POINTS

<<A>> PISTON/PISTON BOOT REMOVAL



Use the special tool, rear disc brake piston driver (MB990652) to turn the piston as shown, and remove it from the caliper body.

<<B>> PISTON SEAL REMOVAL

⚠ CAUTION

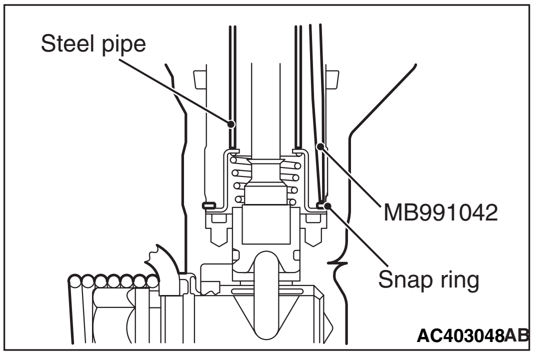


Do not use a flat-tipped screwdriver to remove the piston seal. This may damage the inner side of the cylinder.

1. Remove the piston seal with your finger tip.
2. Clean the piston surface and inner cylinder with alcohol or brake fluid DOT 3 or DOT 4.

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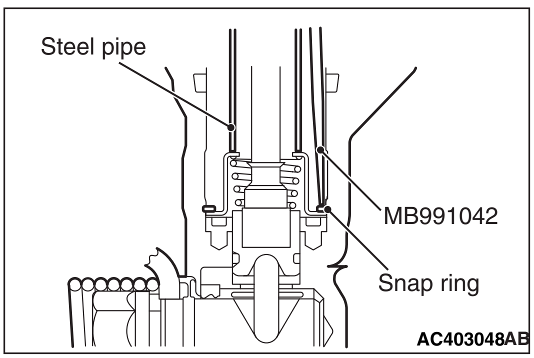
<<C>> SNAP RING REMOVAL



While pressing the spring case with a steel pipe (approx. 19 mm dia)., use the special tools, snap ring pliers (MB991041) and claw (MB991042) to remove the snap ring.

ASSEMBLY SERVICE POINT

>>A<< SNAP RING INSTALLATION

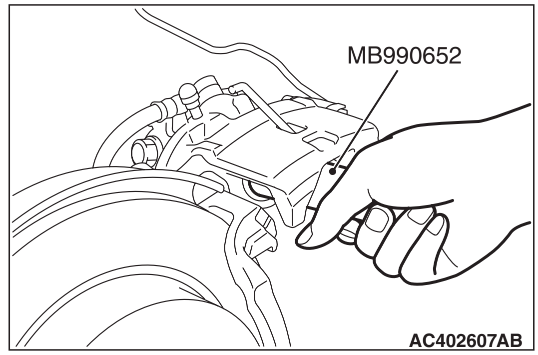


⚠ CAUTION

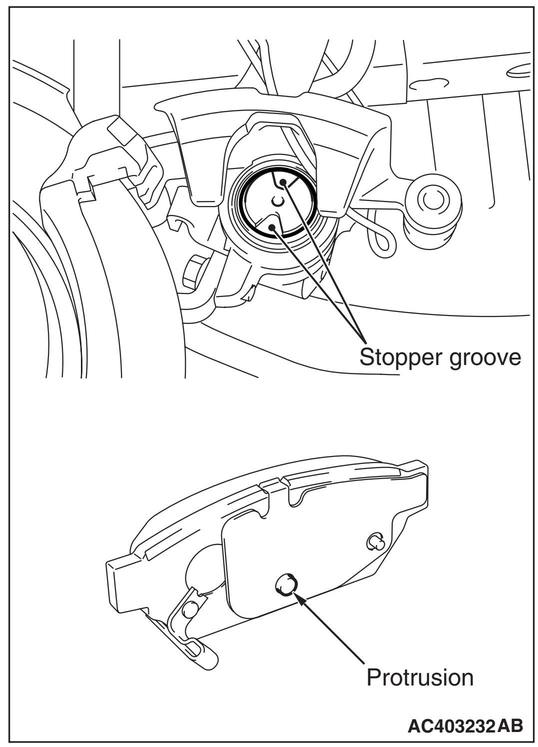
Install the snap ring so that the snap ring opening faces the bleeder side.

While pressing the spring case with a steel pipe (approx. 19 mm dia)., use the special tools, snap ring pliers (MB991041) and claw (MB991042) to install the snap ring.

>>B<< PISTON INSTALLATION



1. Use the special tool, rear disc brake piston driver (MB990652) as shown to turn the piston and install to the caliper body.

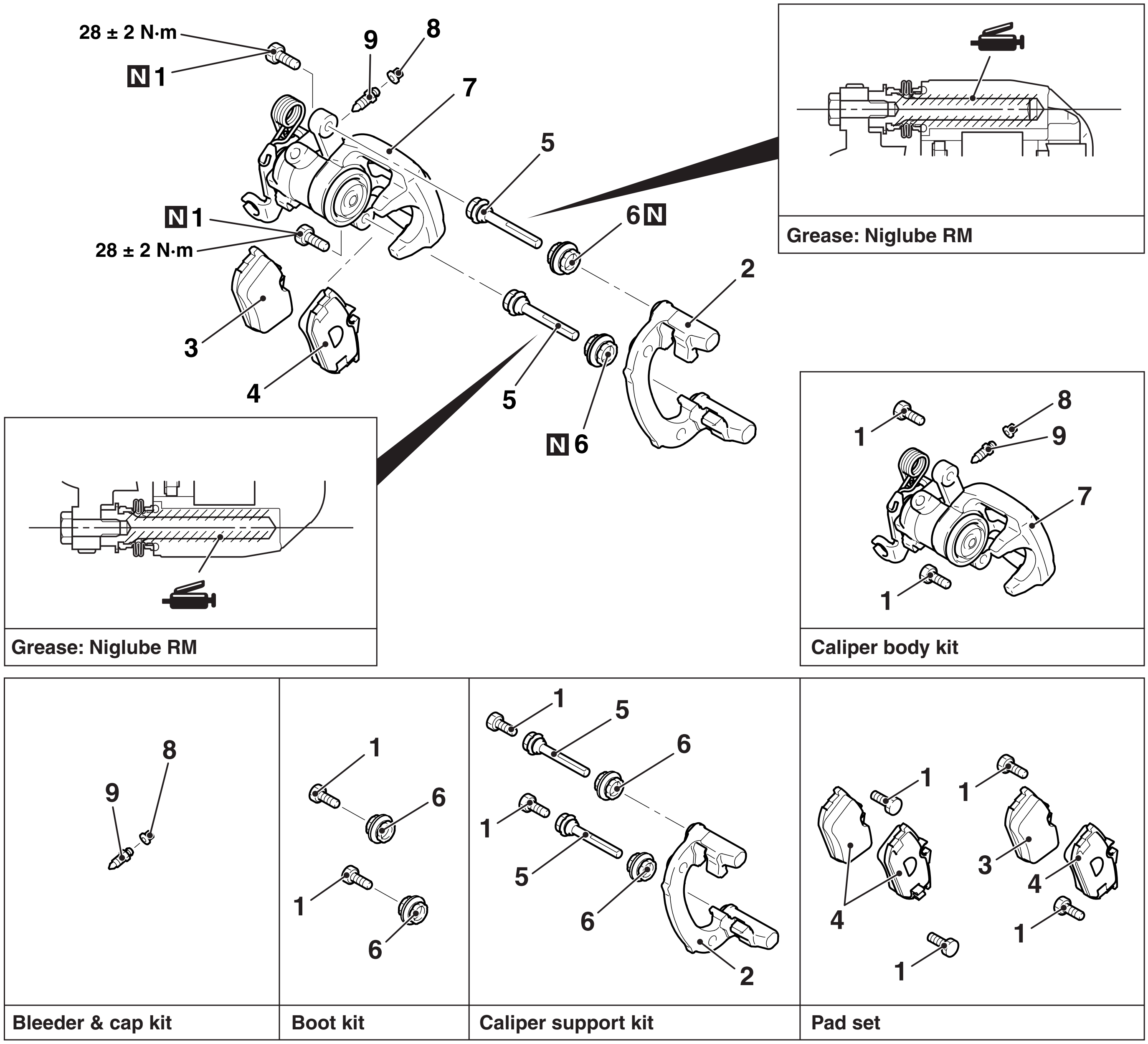


2. Set as shown so that the protrusion on the pad assembly rear face is engaged in the piston stopper groove.

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DISASSEMBLY AND REASSEMBLY <RALLIART VERSION-R>

M1351007200620



AC601129AC

Disassembly steps

1. Bolt
2. Caliper support
3. Pad and wear indicator assembly
4. Pad assembly
5. Guide pin

Disassembly steps (Continued)

6. Boot
7. Caliper body
8. Bleeder cap
9. Bleed screw

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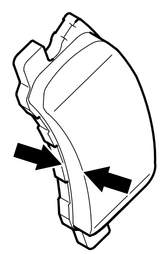
INSPECTION

M1351015000289

PAD WEAR INSPECTION

⚠ CAUTION

- **Replace the both pads (right and left) as a set.**
- **If there is a significant difference in thickness between the pads at right and left, check the sliding area.**



AC303231

Measure the pad thickness at the most worn area. If the pad thickness is less than the limit value, replace the pad assembly.

Standard value
<VR-X>: 9.5 mm
<RALLIART Version-R>: 10.0 mm

Minimum limit
<VR-X>: 2.0 mm
<RALLIART Version-R>: 1.5 mm

REAR DRUM BRAKE <LS, VR>

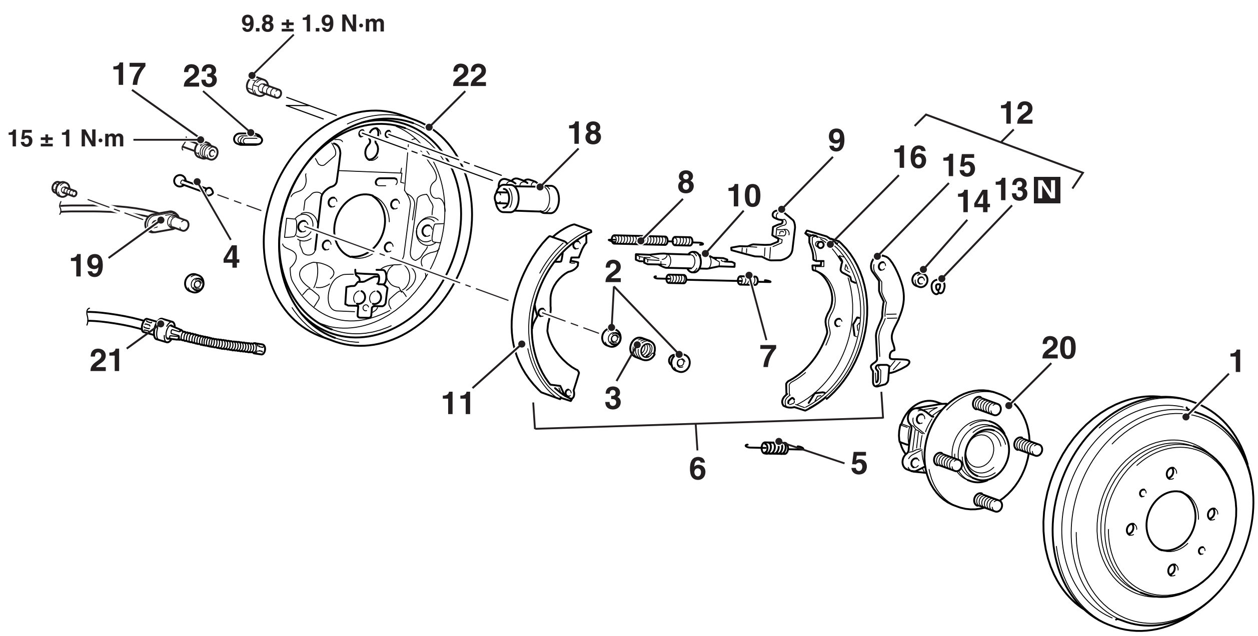
REAR DRUM BRAKE REMOVAL AND INSTALLATION

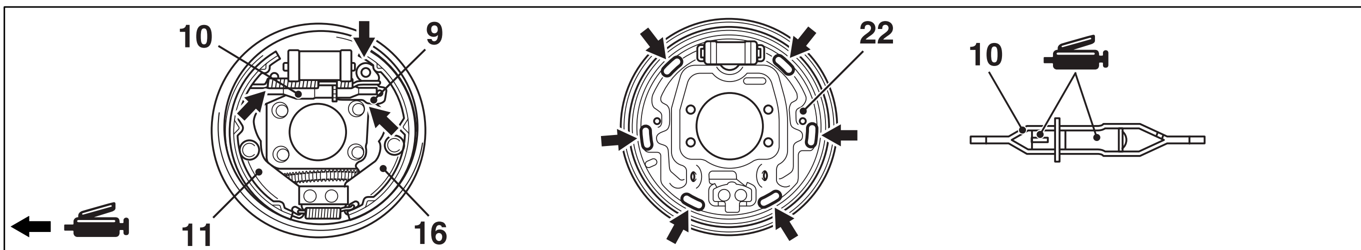
M1351007500676

⚠ CAUTION

- **The vehicle speed detection encoder collects any metallic particle easily, because it is magnetised. Make sure that the encoder should not collect any metallic particle. Check that there is not any trouble prior to reassembling it.**
- **When the rear wheel speed sensor is removed and installed, make sure that its pole piece does not contact with surrounding parts to avoid damage.**

Pre-removal Operation	Post-installation Operation
• Brake Fluid Draining	• Brake Fluid Filling and Air Bleeding (Refer to P.35A-10). • Parking Brake Pedal Stroke Adjustment (Refer to GROUP 36, On-vehicle Service − Parking Brake Pedal Stroke Check and Adjustment P.36-4).





Specified grease: Brake grease SAE J310, NLGI No.1

AC314198AC

Removal steps

<<A>> 1. Brake drum
- Parking brake cable and shoe and lever assembly connection

2. Shoe hold-down cup
3. Shoe hold-down spring
4. Shoe hold-down pin

Removal steps (Continued)

5. Retainer spring
6. Shoe and lining assembly, shoe and lever assembly, auto adjuster assembly, adjuster lever, Shoe-to-lever spring and shoe-to-shoe spring

Removal steps (Continued)

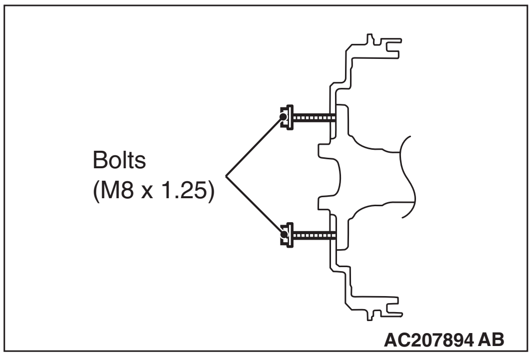
7. Shoe-to-shoe spring
>>**C**<< 8. Shoe-to-lever spring
>>**C**<< 9. Adjuster lever
>>**C**<< 10. Auto adjuster assembly
>>**C**<< 11. Shoe and lining assembly
>>**C**<< 12. Shoe and lever assembly
<<**B**>> >>**B**<< 13. Retainer
>>**A**<< 14. Wave washer
15. Parking lever
16. Shoe and lining assembly
17. Brake pipe connection

Removal steps (Continued)

18. Wheel cylinder assembly
19. Rear wheel speed sensor (Refer to GROUP 35B, Wheel speed sensor P.35B-80).
20. Rear hub assembly (Refer to GROUP 27, Rear axle hub assembly P.27-6).
21. Parking brake cable removal (Refer to GROUP 36, Parking brake cable P.36-8).
22. Backing plate
23. Adjusting hole cover

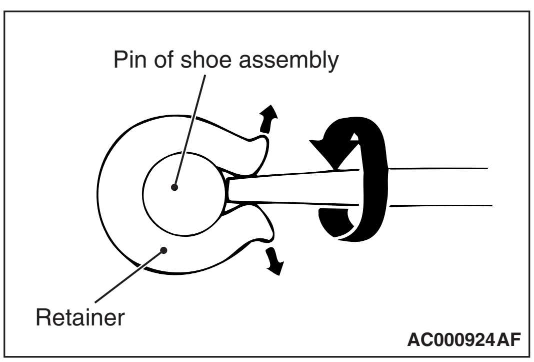
REMOVAL SERVICE POINTS

<<A>> BRAKE DRUM REMOVAL



Use M8×1.25 bolts as shown to remove the brake drum by tightening them evenly.

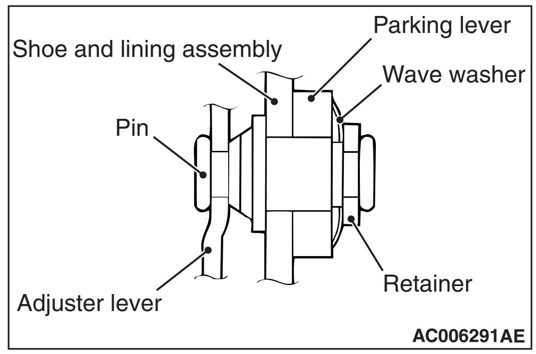
<<B>> RETAINER REMOVAL



Use a flat-tipped screwdriver or a similar tool to open up the retainer joint. Then remove the retainer.

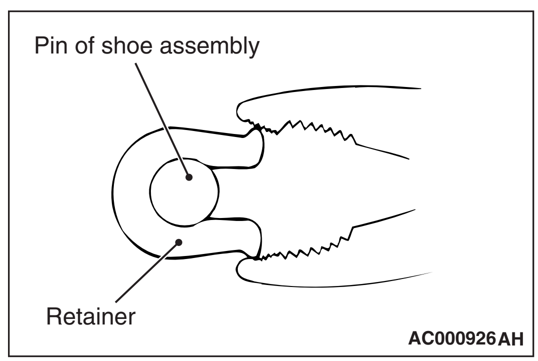
INSTALLATION SERVICE POINTS

>>A<< WAVE WASHER INSTALLATION



Install the wave washer in the direction shown in the illustration.

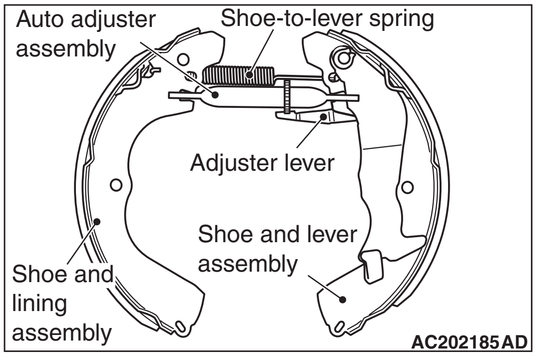
>>B<< RETAINER INSTALLATION



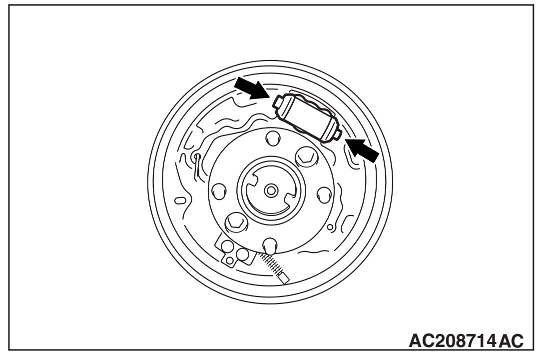
Use pliers or a similar tool to close the retainer end onto the pin.

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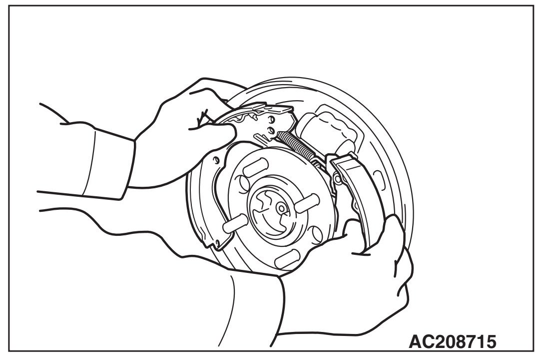
>>C<< SHOE AND LEVER ASSEMBLY/SHOE AND LINING ASSEMBLY/AUTO ADJUSTER ASSEMBLY/ADJUSTER LEVER/SHOE-TO-LEVER SPRING AND SHOE-TO-SHOE SPRING



1. Assemble the following parts temporarily.
   (1) Shoe and lever assembly
   (2) Shoe and lining assembly
   (3) Auto adjuster assembly
   (4) Adjuster lever
   (5) Shoe-to-lever spring



2. Depress the piston by hand.



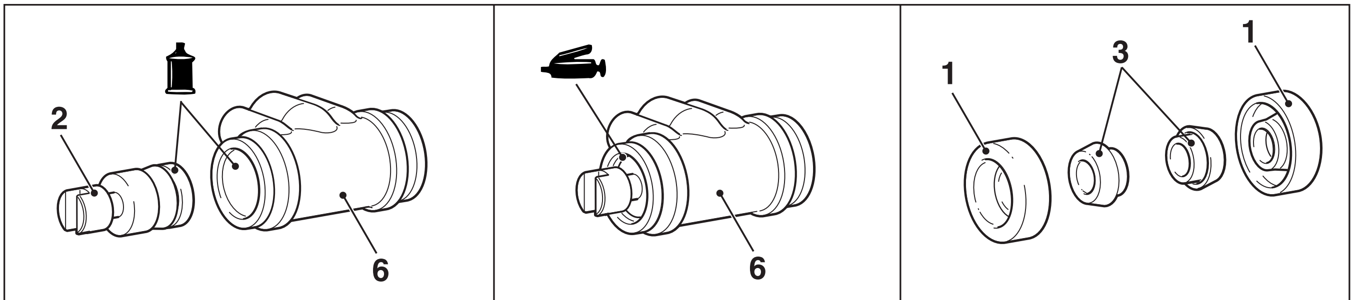
3. Keep the shoe and lever assembly, the shoe and lining assembly, the auto adjuster assembly, the adjuster lever and the shoe-to-lever spring as they are assembled temporarily. Then install that assembly to the backing plate.

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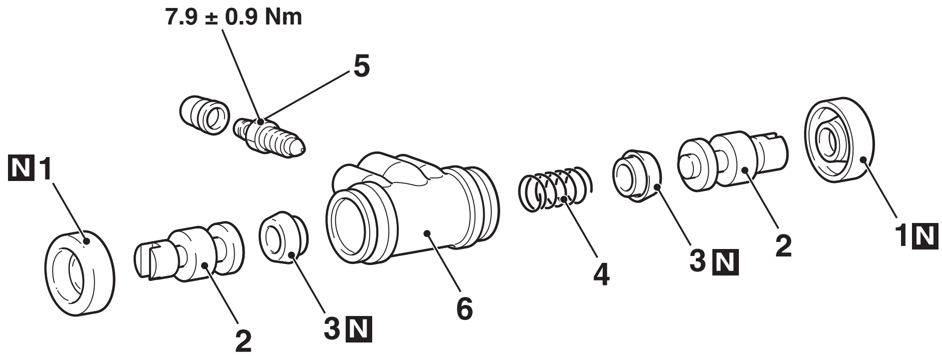
WHEEL CYLINDER

M1351007600156

DISASSEMBLY AND REASSEMBLY



Brake fluid: DOT 3 or DOT 4	Grease: Niglube RX-2	Wheel cylinder repair kit



AC208391AB

Disassembly steps

1. Boots
>>**A**<< 2. Piston
>>**A**<< 3. Piston cup

Disassembly steps (Continued)

4. Spring
5. Bleeder screw
6. Wheel cylinder body

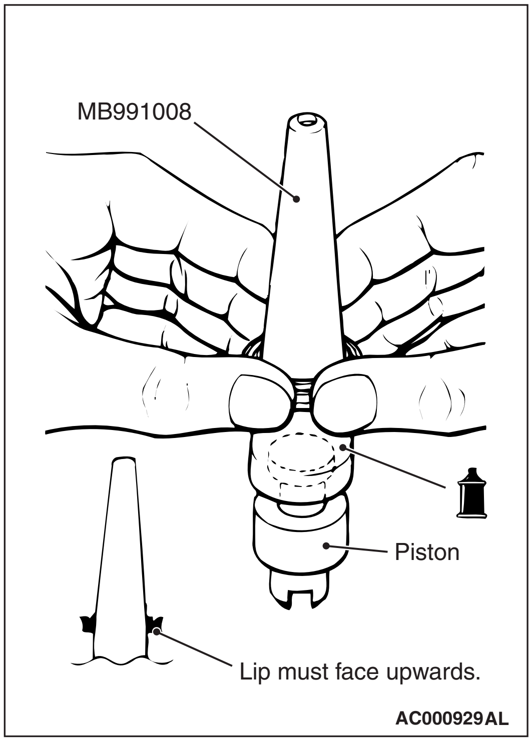
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REASSEMBLY SERVICE POINT

>>A<< PISTON CUP/PISTON INSTALLATION

1. Use alcohol or brake fluid DOT 3 or DOT 4 to clean the wheel cylinder and the piston.

⚠ CAUTION



In order to keep the piston cup from becoming twisted or slanted, slide the piston cup down special tool installer (MB991008) slowly and carefully, without stopping.

2. Apply brake fluid DOT 3 or DOT 4 to the piston cups and special tool installer (MB991008).
3. Set the piston cup on special tool with the lip of the cup facing up. Fit the cup onto special tool, and then slide it down the outside of special tool into the piston groove.